THE UNIVERSITY OF ALBERTA

A DESCRIPTION AND COMPARISON OF SELECTED CONTEMPORARY ELEMENTARY SCHOOL INDUSTRIAL ARTS PROGRAMS IN THE UNITED STATES OF AMERICA

by

 Geoffrey T. Nicholls

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF INDUSTRIAL AND VOCATIONAL EDUCATION

EDMONTON, ALBERTA

SPRING, 1972

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "A Description and Comparison of Selected Contemporary Elementary School Industrial Arts Programs in the United States of America," submitted by Geoffrey T. Nicholls in partial fulfilment of the requirements for the degree of Master of Education.

ABSTRACT

The purpose of this study was to describe a number of selected elementary school industrial arts programs in the United States of America and to determine common elements through the application of a developed instrument. More specifically, the study focused upon: (1) The review of available literature on elementary school industrial a arts in the United States of America; (2) the description of a selected number of contemporary elementary school industrial arts programs in the United States of America; (3) the development of an instrument to analyze the selected programs; and (4) the analysis of the selected programs with the developed instrument.

To attain the stated objectives of this study it was necessary to develop an operational framework. Literature was reviewed to identify approaches, movements and programs in industrial arts at the elementary level. Current programs were identified and described. Common elements were determined by means of a conceptual framework. Areas of agreement were noted and comparisons made under the major headings of objectives, content and teaching methods. Statements were then statistically compared using factor analysis and factor scores for each program on the identified factors.

The following major conclusions were made:

[illegible]

[illegible]

[illegible]

[illegible]

(1) There was general agreement that provision should be made for the development of traditional aspects such as psychomotor skills and desirable, safe work habits. The acquisition of worthwhile work attitudes such as co-operation and appreciation of a job well done was also emphasized.

(2) Emphasis was placed upon programs playing a supportive role for other subjects in the elementary school.

(3) The programs emphasize the need for an industrial arts specialist or consultant who functions as an adviser, co-operating with the teacher in planning activities and developing a separate activity plan to suit the needs of each class.

(4) Little emphasis was placed upon a structured program of activities, general agreement being indicated that programs should not be tied to a fixed timetable or content structure.

(5) There was emphasis placed upon the importance of activities involving the world of work and the use of a variety of materials and processes.

(6) There was general agreement that provision should be made for pupils to explore, experiment and develop individuality through a program which accommodated for individual differences in ability and interest.

ACKNOWLEDGEMENT

A study of this type would have been impossible without the assistance of numerous persons involved in the implementation and direction of elementary school industrial arts in the United States of America. In this respect, the writer is indebted to the past and present executive of the American Council for Elementary School Industrial Arts and to the directors of the ten programs reviewed in this study.

The writer is indebted to his thesis adviser, Darius R. Young, for the encouragement, suggestions and direction provided in completing the research. Acknowledgement is made, also, of the considerable assistance and guidance provided by J. Fred D. Ilott and Jim M. Lombard, the other members of the thesis committee. Further, appreciation is expressed to Milton W. Petruk for his assistance with the statistical portion of this study.

Finally, the writer gratefully acknowledges the contribution to the study made by his family who, over the years, have learnt to take the inconveniences associated with 'after hours' study as a matter of course.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

THE PROBLEM

Orientation to the Problem

In recent decades, the elementary school curriculum has been modified by startling changes in content and methods of instruction. Such changes reflect the combined forces of an increasing body of knowledge, a changing technology accompanied by changes in living patterns and extensive efforts by educators to modify education. As the business of living becomes more complex and subject matter changes, the curriculum developer is confronted with a tremendous challenge as he constantly searches for ways and means of making educational programs more relevant to children's needs.

One constant source of information used in assessing and changing existing programs, or implementing new ones, is that obtained by examining content and approaches adopted in other schools, school districts, provinces and often other countries.

This can only be done effectively after an analysis of these programs has been made to determine their common elements, basic objectives and philosophies. Such an analysis provides curriculum developers with a theoretical and practical base as a point of departure from which planning for future programs can be made.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

One of the problems that has long plagued educators involved with the development of industrial arts programs for the elementary school in the United States is their lack of a common understanding of what is being promulgated in the field. Scobey (1966) recognises this when she cites the two major problems in the field as being:

> First, the confusion amongs educators as to the definition of or concept about industrial arts at the elementary level; and secondly, there appears to be no effective program accordant with a broad concept of industrial arts and unique to the specific characteristics of the elementary school curriculum (p. 24).

As a result, many plans have been developed with little concern for preceding or existing attempts in program development.

This study attempted to provide a basis for comparison of such programs by describing a number of contemporary programs for elementary school industrial arts and identifying common elements within them which related to objectives, content and teaching methods. In this respect, this chapter reports the statement of the problem, the significance of the study, delimitations for the study, assumptions, terminology pertinent to the study and an overview of methodology for the study.

Statement of the Problem

The problem to which this study was directed was to describe a number of selected elementary school industrial arts programs in the United States of America and to determine

common elements through the application of a developed instrument. More specifically, the study focused upon: (1) The review of available literature on elementary school industrial arts in the United States of America; (2) the description of a selected number of contemporary elementary school industrial arts programs in the United States of America; (3) the development of an instrument to analyze the selected programs; and (4) the analysis of the selected programs with the developed instrument.

The Significance of the Study

A number of universities, states and school districts throughout the United States of America have begun to place increasing emphasis upon the need for an understanding of technology and the world of work at the elementary school level. This body of subject matter has been grouped under the heading of industrial arts and a number of significant contemporary programs have been developed in various areas throughout the United States which could provide curriculum developers with insights into its application within the classroom. These programs have employed a wide gamut of practices variously combined.

This study has sought to describe a selected number of these contemporary programs and to develop a conceptual framework designed to analyze them so that areas of general agreement in terms of content, objectives and teaching methods

can be identified. Further, a review has been made of an ever increasing amount of relevant literature applying to the subject field in the United States to assess current thought associated with the programs being implemented.

That there is a need for such a study is succinctly pointed out in the Bertie County Schools Elementary School Industrial Arts Curriculum Guide for Grades K-7 (1971):

> Administrators, teachers, students and parents from all areas of the United States are asking an important question. "What is Elementary School Industrial Arts and what are its major concepts, points of view and unique contributions to the educational process for students?" (p. iv).

In indicating that no satisfactory answer can be given to this question the same Curriculum Guide states:

> Any individual interested in elementary school industrial arts can usually find numerous references to published and well documented sources providing definitions, concepts, and even objectives of elementary industrial arts. A big problem, however, is that each source will usually give a different philosophy and definition which leaves the reader more confused than when he first initiated his diligent search for information (p. iv).

With this in mind, this study provides a common understanding of programs being promulgated in the field through a review of relevant literature, and description and analysis of a number of selected contemporary programs. It is further anticipated that the information provided in this study could hasten research and development aimed at the introduction of improved educational programs involving a study of technology and the world of work at the elementary school level

in other areas of the United States and in other countries whose technologically oriented society indicated a need for such a program.

Delimitations of the Study

The study is concerned only with selected contemporary elementary school industrial arts programs in the United States of America. In this respect, contemporary was used as a delimitating factor referring only to those programs in operation during the 1970-71 school year.

Further, twelve of these contemporary programs were selected by the researcher from those nominated by past and present executive of the American Council for Elementary School Industrial Arts, a Council of the American Industrial Arts Association, as being the most significant programs in the field at the present time.

The conceptual framework served as another delimiting factor since only those elements considered under the major headings of (a) objectives, (b) content, (c) teaching methods were analyzed. The developed instrument may have implications for other fields, but was designed specifically to meet the needs of approaches to curriculum within the field of elementary school industrial arts.

Finally, past and present executive of the American Council of Elementary School Industrial Arts were asked to apply the following selection criteria to the programs nomin-

[illegible]

ated by them as being the most significant in terms of content and purpose.

1. That the program is ongoing or has been at the experimental and testing stage within an elementary school or schools for at least a full school year.

2. That descriptive material concerning the program was available in the form of articles or printed releases.

Assumptions

At the onset of the study, the following assumptions were made:-

1. It was assumed that sufficiently unique and isolated elementary school industrial arts programs existed within the United States for them to be identified and described.

2. It was assumed that, if sufficient programs existed, they contained identifiable elements which could be used for analysis within the developed conceptual framework.

3. It was assumed that the developed instrument would identify the common elements in the programs chosen for comparison.

Terminology Pertinent to the Study

<u>Industrial Arts</u>: A generic term used in referring to arts and crafts, handicraft, integrated handwork, construction activities, creative arts, practical arts and other terms

used to identify activities in the elementary school involving tools, techniques and materials.

The following definition used in the report on the National Conference on Elementary School Industrial Arts, Greenville, North Carolina, 1971, was used to define the term for the purpose of this study:

> It deals with ways in which man thinks about and applies scientific theory and principles to change his physical environment to meet his aesthetic and utilitarian concrete experiences which include manipulation of materials, tools, and processes, and other methods of discovery. It includes knowledge about technology and its processes, personal development of psychomotor skills, and attitudes and understandings of how technology influences society (p. 3).

Elementary School: Elementary refers to grade one up to and including grade six.

Programs: Specific plans that have been developed in an attempt to organize curriculum offerings in industrial arts in elementary schools.

Contemporary Programs: Those elementary school industrial arts programs in operation within the United States during the 1970-71 school year.

Content: The facts, information, knowledge or relationships constituting the substance of the curriculum. It is the subject matter to be acquired by the student (Cochran, 1968, p. 13).

Objectives: The stated phases that provide stepping stones to the fulfilment of the aims of the program. They serve to select, regulate, and direct activities designed and inte-

grated in the curriculum (Cochran, 1968, p. 13).

Teaching Methods: The instructional factors that are viewed in the light of knowledge, purpose, and other elements that enter into the educative process, including the nature of the pupil, the materials of instruction and the total learning situation (Good, (Ed.) 1959, p. 553-54).

Conceptual Framework: The basic structure used to define and analyze programs within a particular field (In this case, elementary school industrial arts). It reveals the important curricular elements, sources for their selection, and the various existing relationships between them, including objectives, content and teaching methods (Cochran, 1968, p. 12).

Overview of Methodology for the Study

The methodology used in this study, especially with respect to the development of a conceptual framework for elementary school industrial arts, follows closely the methodology used by Cochran (1968) who used a conceptual framework to identify common elements relative to objectives, content and teaching methods for seven secondary school industrial arts programs in Indiana, Illinois, Michigan, Ohio and Wisconsin.

To attain the stated objectives of this study it was necessary to develop an operational framework. This involved a review of the literature, an identification and selection of programs to be studied, the development of an instrument .

to determine common elements within the selected programs and methods for collecting, analyzing and interpreting data.

Review of the Literature

A review was made of periodicals and references in order to provide an overall perspective for the study and to suggest basic relationships between current elementary school industrial arts programs. Specifically, the literature was reviewed with respect to the evolution of concepts regarding the place and function of industrial arts in elementary education; current thought relating to its purpose and nature; the content of various programs and the instructional factors involved.

This involved consideration of articles in such periodicals as The Industrial Arts Teacher, School Shop, Man, Society and Technology, Industrial Arts and Vocational Education, Journal of Industrial Arts Education, School Executive, Instructor, Journal of Industrial Arts Teacher Education, American Vocational Journal, Education Digest, and New York State Education. Attention was focused also on Addresses and Proceedings of the Annual American Industrial Arts Association Conventions, from 1960 to 1971. Textbooks in the field of elementary school industrial arts, particularly those published during the past ten years, as well as related bulletins and articles released by the American Council for Elementary School Industrial Arts, Bertie County Board of Education, State of New Jersey Department of Education, Los Angeles City School District Division of Elementary Education,

City School District, Rochester, New York, and Centennial Schools, Warminster, Pennsylvania, were also consulted.

This overview, presented in Chapter II, focused primarily on approaches, movements and programs in industrial arts at the elementary school level. Selected historical developments were noted but attention was centred on events from approximately 1960 onwards.

Identification and Selection of Contemporary Programs

From the review of the literature in the field and with the aid of Dr. William A. Downs, a member of the current executive of the American Council for Elementary School Industrial Arts, ten past and present members of the executive of this Council were identified. These persons were contacted and asked to list the ten programs which they considered best suited the criterion already outlined. Eight of the persons responded with lists of selected programs. All told twenty six programs were nominated and of these, twelve were nominated by at least two persons. These twelve programs were selected as being the most significant. Chapter III details the identification and selection procedure, followed by a description of the selected programs.

Development of the Instrument

Prior to the construction of the instrument for comparison of the selected programs, an extensive review was made of related research material, publications and text books in the fields of curriculum and elementary school industrial arts.

As a result of this review, one hundred and fifteen statements were identified relating to objectives, content and teaching methods for elementary school industrial arts. Focusing attention on the elimination of duplication, improved clarity, and conciseness, these statements were reduced to fifty-two.

A Q-Sort method was adapted to provide a forced-choice procedure for the study. Details of the refinement of the statements, the criterion used for the selection of the Q-Sort method and a list of the fifty-two statements which constitute the instrument are described in Chapter IV.

Data Collection

The following procedures were utilized to obtain descriptive material from each of the twelve programs and to compare them with the developed instrument: (1) An initial request was sent to each of the leaders associated with the programs to secure articles and other materials describing their program. From this material, a description was made which involved program development, program objectives, program content, and activities carried out. The resulting descriptions were referred back to the respective program leaders for refinement and editorial suggestions; (2) The fifty-two statements, in Q-Sort form, together with appropriate introduction and instructions, were sent to each of the program leaders.

Data Analysis

The data collected and reported in Chapter V were

synthesised by means of the conceptual framework, common elements being identified in terms of their rating according to the proportion of frequency with which they appear in the analyzed programs. Areas of agreement were noted and comparisons made under the major headings of objectives, content and teaching methods. A statistical interpretation of the data was then made by carrying out a factor analysis in order to resolve the statements in terms of a number of categories or factors. Factor scores were computed for each program on each of the identified factors and the resultant findings related to the visual interpretation of the rankings.

CHAPTER II

REVIEW OF RELATED LITERATURE

The preceding chapter provided a general overview of the purpose and direction of this study. This was accomplished by the inclusion of sections concerning an overview of the study, its significance, delimitations and methodology. It is the purpose of this chapter to provide an overview of the approaches, movements and programs in industrial arts at the elementary level in the United States of America as they are reflected in the literature related to the field.

During the past fifteen years, an increasing amount of literature has been written about industrial arts in the elementary school system of the United States. This can be attributed to a national re-awakening of interest in activities involving the application of tools and materials in the elementary school. The present chapter is devoted to conveying the nature of some of this literature, particularly with respect to the evaluation of concepts regarding the place and function of industrial arts in elementary education; current thought relating to its purpose and nature; the content of various programs and the instructional factors involved.

Evolution of Concepts Regarding the Place and Function of Industrial Arts in Elementary Education in the United States

While there has been a recent emphasis upon industrial arts in the elementary school, the idea is anything but new in the United States' educational system. Indeed, Thrower (1965) emphasizes that industrial arts within the total educational system in the United States had its beginnings in the elementary school and as "public education expanded upwards into the adolescent years, industrial arts moved with it (p. 33)."

Gerbracht (1956) in tracing the development of industrial arts in elementary education in the United States, holds that "early concepts of the place and function of manipulative experiences have undergone some rather drastic revisions in the course of more than a century (p. 1)." He points out that earliest attempts to include "practical, manipulative-type work" in elementary schools was designed to serve two main purposes:

> The more often mentioned of these was to develop certain tool skills thought to be basic to many manual operations and trades - homemaking as well as industrial trades. In helping with this idea a lot was said about manual dexterity and hand-eye coordination. The school desired to lay a foundation for the sort of work for which many of its pupils were destined. And second it was thought that manipulative experiences would provide for constructive use of leisure time, thus serving a social purpose as well as a vocational one (p. 1).

The next significant step Gerbracht sees leading away.

from manipulative-type work experiences was the construction-activity concept which was developed in the 1880's in "an effort to relate the manipulative experiences of pupils organically to the rest of school studies (p. 1)." Adherents felt that aesthetic values and mathematical and physical principles would be much better taught through working with material things. This approach, he continues, led to the development of the concept that "manual activities were important no matter what the future vocation of a pupil might be (p. 1)."

In this manner early emphasis on foundations for trade vocations appears to decline in favor of an emphasis on the pedagogical values of manipulative experiences. Gerbracht (1956) notes that this led to a significant change in method. Products constructed were small and had little functional value and were usually arranged in a series, so that succeeding projects were increasingly difficult. Later schools of thought had three main criticisms of this approach:

> One of these criticisms held that too much emphasis was placed on skill development and not enough on knowledge related to production. Another criticism was that little or no concern was given to good design in the products constructed. And the third criticism was that no attention was given to relating construction activities to the rest of the curriculum, even where such relationships were most obvious (Gerbracht, 1956, p. 2).

Gerbracht continues, stating that, in efforts to remedy these points, industrial arts took on a nature which could best be described as "arts and crafts," especially with

respect to the second criticism. In connection with the last point, he saw many approaches to industrial arts going even further than relating construction activities to the rest of the school program. From the point of view of these approaches, industrial arts served best when it was used to facilitate the teaching of the regular subjects. It should have no sequence of its own at all, but should be used as "a technique to illustrate and otherwise assist in the teaching of science, mathematics, language and social studies (p. 2)." In this manner the initial emphasis on tool skills was further reduced.

Gerbracht (1956) points out that John Dewey's School and Society (1899) further attacks the formalized sequence of manual activities. "Dewey conceived of industrial occupations as the very core of the schools program (p. 2)" he states and then continues:

> . . . it was his [Dewey's] idea . . . that school experiences should start with real activities, and that subject matter should be learned when and where its need becomes apparent in the course of carrying on the activity (p. 2).

Babcock (1961) supports Gerbracht when he states: "In his University Elementary School in Chicago, he Dewey used manual training and industrial occupations as teaching methods for all of the 'other subjects' (p. 36)." Dewey (1915), himself, in describing several basic impulses relating to motivation has this to say about the constructive impulse:

> The child's impulse to do finds expression first in play, in movement, gesture, and make believe, becomes more definite, and seeks outlet in shaping materials into tangible forms and permanent embodiment (p. 43).

Babcock (1961, p. 36) holds that the turmoil which arose amongst those who sought to interpret Dewey's point of view did not centre around the validity of 'handwork,' but rather the conflict seemed to be over how handwork could contribute to the overall curriculum. Gerbracht (1956) comes to the same conclusion:

> Most of those who sought to interpret Dewey's point of view . . . preferred to retain the logical subject-matter sequence in the school's curriculum. But more and more construction activities were expanded from the mere skill emphasis to include also appreciation and understanding of industry and (a fairly new idea at the time) intelligent selection and use of industry's products (p. 2).

As the products to be selected and used wisely became more the result of mechanical rather than hand processes, and industries studied became more mechanized, the new term 'industrial arts' gained wide acceptance as properly describing the subject matter of the programs whose content emphasized these areas.

By the 1920's the divergent points of view as to the purpose and function of industrial arts in the elementary school had reconciled themselves into two principle schools of thought:

> One conceived of industrial arts as a subject matter field, valid for its own content, designed primarily to develop manipulative

> skills, but taking some account also of information related to production. The other conceived of industrial arts activities as means or method in the teaching of standard subject matter - illustrative or motivational in character (Gerbracht, 1956, p. 3).

The literature places great emphasis upon the attempts of Dr. Frederick G. Bonser, Teachers' College, Columbia University, to reconcile the divergent points of view relating to elementary school industrial arts into some sort of compromise plan.

His approach, set forth in Bonser and Mossman, Industrial Arts For Elementary Schools (McMillan, 1923) and elsewhere, encompassed many of the ideas thus far outlined and included some new ones. He conceived of elementary school industrial arts as both content and method and not separately as a subject matter field, valid for its own content or as a means or method in teaching standard subject matter.

Thrower (1965) in developing a point of view towards a common basic understanding of the purpose of the elementary school, and elementary school industrial arts in particular, quotes Bonser as saying that the work of the elementary school should include " . . . those elements of study which are of common value to all . . . (p. 34)." Gerbracht (1956, p. 3) points out that he (Bonser) admitted the validity of such subjects as science, mathematics, language and social studies but further stated: "Is there not also a body of experience and knowledge relative to the industrial arts which is of common value to all, regardless of sex or occupation? .

(p. 3)."

Sredl (1966) describes Bonser as the most influential leader in elementary school industrial arts in the 1920's and notes the following statement he makes regarding the content of industrial arts programs:

> In the elementary school, the emphasis in the study of the industries must naturally and necessarily be placed upon the materials, processes and methods that bear upon the selection and use of industrial products. That kind of study of foods, clothing, shelter, utensils, tools, machines, and other utilities which gives a knowledge of quality, economic value, artistic excellence, and appropriate usage includes practically all other elements of value as by-products in the study of industry (p. 33).

Sredl (1966) also lists three statements made by Bonser as being the purposes of industrial arts in the elementary school:

1. To develop intelligence, efficiency, and enjoyment in the use of industrial products.
2. To develop intelligence about the work and conditions of industrial workers.
3. To cultivate a sympathetic, appreciative attitude toward the workers and an intelligent interest in sharing in the means for regulating the production, distribution, and use of products which will assume fairness of treatment to all alike (p. 33).

Bonser obviously saw industrial arts as providing a means of directing the activities of the elementary school pupil, both physical and mental, towards many desirable objectives. His publication Industrial Arts for Elementary Schools (McMillan, 1923) written in conjunction with Lois Coffey Mossman, a fellow lecturer at Columbia University has remained the standard text on elementary school industrial

arts for many years and his statements relating to the place and function of industrial arts in the elementary school are reflected in approaches to many current programs.

The number of ideas about what industrial arts in the elementary school should be, often reflected in the number of names it is given (arts and crafts, handicrafts, integrated handwork, construction activities, creative arts, practical arts are some) indicates clearly the diversity of approach, with respect to place and function, which has developed over the past half century. Some programs place emphasis on materials to be used; others shift the emphasis from materials to skills or attempt to combine both emphases. Further programs see the enrichment of general classroom studies as a major purpose, materials and skills being coincidental (Babcock, 1961, p. 33).

Thrower (1965) sees numerous purposes and functions being purported for elementary school industrial arts and lists the following as being most significant:

> Industrial arts reduces the level of abstractions, enriches the elementary curriculum, motivates the learner, correlates and integrates subject matter, and teaches fundamental skills (p. 34).

The purpose of this section of the review of the literature has been to review the principal points in the evolution of concepts regarding the place and function of industrial arts in the elementary school. Current thought on the place and function of this subject field, outlined in the remainder of this chapter, will indicate that programs today run a wide

gamut of these early approaches, variously combined.

Current Thought Relating to the Purpose and Nature of Industrial Arts in the Elementary School

An examination of the evolution of concepts regarding the place and function of industrial arts in the elementary school has shown that there was a wide number of approaches made as to the rightful place and function of the subject field in elementary education. This diversity is evidenced in current literature dealing with the development of an organized course of study for elementary school industrial arts. The most marked differences in philosophy toward the subject field are exhibited in the number of purposes the subject is purported to serve.

Some educators see industrial arts activities at the elementary level as only making things. Others believe that all activities should be correlated to the elementary academic subjects. A third group believes that a blend of correlated projects for personal and recreational purposes is best. A fourth group would limit industrial arts activities to a study of industry in the culture as another subject for the elementary school.

The most widely acclaimed purpose appears to be that of the study of industry as a subject on its own, as a subject having both content and method, or as a means of better understanding facets of industry and technology included in

the elementary school curriculum. Scobey (1966) indicates that industry should be part of the elementary school curriculum when she states:

> Our emphasis then is upon industry. To interpret industry, children need to consider not only processes, tools, and materials but also products, occupations, and work patterns, accumulated knowledge and problems of life related to industry, and the means by which man has adapted his physical environment to serve his needs (p. 25).

Scobey is supported in her contention that industrial arts in the elementary school is the "authentic all inclusive study of industry and the technology of man (p. 25)" by Dreves (1971), Hackett (1966), Hauenstein (1969), Hootes (1968), Jackman (1970), Williams (1964) and others.

Hackett (1966) sees the importance of industry in modern day society as being reason enough for its addition to elements already in the elementary school curriculum:

> Industry has come to occupy an ever increasing place of importance in the social, economic and political aspects of life today. Therefore there is abundant reason why, in order to help children adjust to the large and tremendously important industrial element which surrounds them, this element should be added to the humanistic and scientific elements already in the elementary school program (p. 58).

He includes within his "industrial element" agriculture, mining, construction, transportation, communication, trade and the services as well as the manufacturing industries (p. 58). In another article (Hackett, 1965) he stresses that a curriculum without an industrial element in no

way reflects contemporary culture:

> Boys and girls today know almost nothing about any product they use. This appalling ignorance of products, occupations and industries is the concomitant outcome of an educational program that does not accurately reflect our culture (p. 228).

Hauenstein (1969) in outlining the development of an industrial arts program for grades K-6 at Ohio State University in 1968, describes the major objective of the program as being "to develop a curriculum and instructional scheme to help American youth understand how industry produces the man made world (p. 139)."

Hootes (1968) adopts the same approach as Hackett, emphasizing that the primary purpose of education is to acquaint youth with comtemporary culture:

> The primary purpose of education in any society is to acquaint youth with the nature of the culture in which they live and of which they are a part (p. 5).

He relates industrial arts to an understanding of contemporary culture when he says:

> Industrial arts education . . . is the study of technology leading to the development of understandings and appreciations of our culture and the attainment of knowledge and skills necessary for effective participation in a technological society. Industrial arts, then, is that segment of the school curriculum dealing with the study of technology and having the responsibility of acquainting youth with the nature of the technological culture in which they live and of assisting each in discovering his place in, and his relationship to, this technological culture (p. 5).

"This philosophical basis," he continues, "is in

complete accord with the generally accepted objectives of elementary school education, but its emphasis is on the study of industry (p. 5)."

Ivey (1970) sees the program providing "simulated practical experiences" related to industrial activities and Williams (1964) lists the development of an appreciation of industry as one of the "major and unique" objectives of ind-dustrial arts in the elementary school.

All in some way relate the study of industry to the world of work. Dreves (1971) sees the study of industry as a means of enabling children to "see the world of work as it is (p. 119)":

> Concepts unique to a technical-industrial society are formed as a result of hands-on interaction with the real "stuff" of industry. Children engaged in these activities, as with workers on the job, think, plan, communicate and handle things of technology in order to reach a clear objective. They see the world of work as it is: Society serving society by satisfying man's needs and wants (p. 119).

The report of the National Conference on Elementary School Industrial Arts, Greenville, North Carolina, 1971 (p. 7) points out that one of the philosophical bases for an elementary school industrial arts program is to orient the pupil to the world of work by developing an understanding of industrial processes and insights into manufacture and production.

Hackett (1966) also relates industry to the world of work but places emphasis upon the program providing, through this approach, some form of occupational awareness:

> This proposal to orient the school program to the world of work . . . is based on the hypothesis that the world of work can be used effectively as a framework to unite and direct educational efforts. It stems from a belief that unless the school program accurately reflects work as part of our culture, it cannot purport to transmit our culture. Without this orientation, boys and girls cannot intelligently select and pursue a program of studies that will permit the development of their maximum potential. Consequently occupations and industry - the world of work - should be a recognizable influence in the content and structure of the entire school program (p. 62).

Hackett (1965, p. 229) sees "occupations (the work one does) and industries (the environment in which one does it)" as constituting two of the "few elements of our culture that affect mankind from the cradle to the grave" and believes that the establishment of the world of work, related to the "facts, concepts, skills and values of the culture" would make all subjects meaningful and vital. He sees this being done by providing integrated units of study, at all grade levels, dealing with the study of selected industries and occupations.

Ivey (1970) and Steeb (1969) pursue this occupational awareness approach even further, outlining one of the purposes of industrial arts in the elementary school as being the understanding of the world of work as it relates to such things as occupations, job functions and responsibilities. Steeb sees the industrial arts program as enabling pupils to identify and differentiate a wide variety of occupations. Ivey lists one of the objectives of the Bertie County Schools Program (North Carolina) as the increase of knowledge about

various occupations through "training in and exposure to selected occupational fields (p. 105)."

Dresser (1969) believes that a study of construction cannot be made without involving a study of related occupations:

> The current responsibilities, level of entry preparation and pay scale for general contractors, laborers, engineers, masons, carpenters, steel workers, electricians and draftsmen must be considered, along with occupations just emerging in the labor market (p. 216).

This approach appears to see the purpose of industrial arts as being the development of occupational education in the elementary school. In recent correspondence with the investigator, Mary Margaret Scobey has pointed out that newer programs are being developed around this purpose. She states:

> . . . the trend that seems to be a reorientation of elementary school industrial arts. Some of the first projects focused on technology, but recently the new programs focus on occupational education . . . (Appendix A).

She believes that this trend is the result of separate states in the United States appropriating funds for the development of occupational education in the elementary school and cites as examples the Career Development for Children program in Carbondale, Illinois, and the Project Loom program in Florida.

Equally important as the study of industry and the world of work is the purpose industrial arts in the elementary school serves as a means or method of supporting and consolidating other areas of the curriculum.

This is amplified by Hootes (1968):

> Industrial arts at the elementary school level is not another subject to be added to an already crowded curriculum; it should be an integral part of the already established curriculum . . . an enrichment to that which we now have (p. 10).

He is supported by Gerbracht and Gilbert (1958) who state that "its purpose is to assist in the achievement of the generally accepted goals of elementary education (p. 199)." Other writers expound in similar vein. While all who support this purpose are in general agreement as to its importance, there appears to be many different points of view as to the function elementary school industrial arts will serve in supporting and consolidating other areas of the curriculum.

There are those writers who believe that its function is to enable pupils to investigate and experiment with facets of experiences in other areas of the curriculum. In doing so, they contend, industrial arts will provide a means of bringing about increased meaning and understanding by enabling children to come to grips with intangible and often abstract concepts. They appear to place little emphasis on specific content and see it serving only a supportive role.

Theime and Pugh (1964) adopt such an approach:

> The classroom teacher utilizes handwork in order to add dimension to learning situations, stimulate purposeful reading and accurate observation and group research, and to add variety to classwork. Handwork provides an opportunity to apply principles of construction and design and to develop and encourage creativity (p. 144).

Miller (1962) agrees, contending that industrial arts

must lose its identity as a subject matter field if it is to adequately contribute to the "generally accepted goals of the elementary school program (p. 20)":

> The focus of attention is not to be placed upon the study of tools, materials and processes of industry, but rather should be concerned with bringing increased meaning and understanding to units of instruction through group or individual "constructional activities" (p. 20).

Meyer (1967) sees industrial arts as a means to "motivate further study, clarify thinking and create new interest in regular classroom work (p. 56)." Hoffman (1971) while emphasizing self expression, does recognize some relationship to the understanding of technology when he states that his program provides pupils with "an opportunity to explore and experiment with technological and aesthetic aspects of their experiences in the classroom (p. 113)." He further states that industrial arts is an activity in which "individuals and groups of students can engage in three-dimensional problem solving and creative expression (p. 113)."

Simonson (1970) implies that the content is more specific when, in outlining the Technology for Children (T4C) program operated by the New Jersey State Department of Education's Division of Vocational Education, she says:

> The purpose of this program is to help the elementary classroom teacher to combine technological activities with the academic lessons (p. 76).

Gerbracht and Gilbert (1958) see industrial arts reducing the levels of abstraction to the "point where they can be handled by children (p. 199)" and see this being done

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

by establishing more adequate meanings "through first hand experience with work, machines, mass production, industrial technology, automation, and many other abstractions (p. 199)." Like Simonson they see industrial arts "extending interests and developing the talents beyond the limits posed by mass production in a purely academic setting (p. 119)."

Hootes (1968) sees industrial arts in the elementary school as being the study of industry and technology, drawing its subject matter from the existing curriculum. He believes that such a course aims at "acquainting the child with the technological phenomena of our society and of preparing them to live effectively in such a society (p. 5)." He further sees industrial arts having an aesthetic value:

> Through the study of technology, pupils develop an awareness of the wonders of life so often taken for granted. This study of industrial arts helps to develop an appreciation of what goes into the production of goods and services and of all aspects of our technological environment (p. 7).

Hootes draws the content for such a course from textbooks written for various subject fields in the curriculum, noting that these texts include references to technology and the changes taking place in it. Industrial arts in the elementary school is a means of bringing the study of these technological elements together and in so doing, enable them to be taught in a more tangible and meaningful way:

> Textbooks written for today's elementary school children contain much information about the new and evolving world in which they are being prepared to live. Authors of these texts are aware of the changes that are taking place in society, and they

> have provided text material for the study of some of these changes. There is no evidence that this material is organized so that similar elements of industry will be studied at the same time in various subjects such as language arts, science, and social studies; but, at least, the study of this important segment is included in the textbooks (p. 7).

Williams (1965) in his article "Studying Industry in the Grades," accepts the role of industrial arts as being the study of technology but, like Hootes (1968), sees its main purpose as that of reinforcing and supplementing other areas of the curriculum:

> Elementary school industrial arts must be concerned with modern day technology, because the main goal of elementary school industrial arts is to reinforce and supplement the elementary curriculum (p. 54).

Thrower (1967) further supports the position that industrial arts should be part of the elementary curriculum:

> . . . I am firmly convinced that technology and its implementation through industrial arts activities should be integrated into the very core of the curriculum at every grade level beginning with the kindergarten (p. 198).

Of those writers in the literature who advocate that industrial arts serves as a means of consolidating and supporting other areas of the curriculum, the majority believe the purpose of industrial arts in the elementary school can best be provided by an approach which integrates industrial arts into the curriculum, both as a supportive agent for other subject fields and as a content field of its own. Some writers, such as Hootes (1968) and Hackett (1966) imply this, but Weber (1969) strongly supports this approach. He feels

that a separate, specialized content field approach and a completely supportive role approach would both be unsuccessful. Although he makes no mention of why a separate content approach would be unsuccessful, he makes this observation about the fully supportive role it could play:

> Nor is it sufficient to be ready to help if we are needed. "We are studying Egypt in class - can you come in and show us how to build a pyramid (p. 213)."

Scobey (1968) is equally emphatic that industrial arts cannot be a separate subject area:

> Industrial arts cannot be an isolated, separate subject because the techniques and processes with which it is concerned are part of a man's life. These techniques and processes have been dependent upon and in turn have affected human relations. Thus, study of industrial arts contributes to the study of man's activities in a particular social setting and cultural environment which man created to some extent through the invention of tools and processes (p. 7).

She is a strong advocate of the integrated approach:

> As an integral part of the elementary school curriculum, industrial arts can reinforce almost all subject matter areas of the curriculum as well as contribute its own unique content related to industry (p. 7).

Speaking as a panel member of a session entitled "Why Elementary School Industrial Arts," at the 33rd Annual National Convention of the American Industrial Arts Association held at Miami Beach, Florida in April 1971, she substantiates this statement:

> I must agree that industrial arts should be an interdisciplinary part of the elementary school curriculum. That is, the concept of industrial arts is developed through

> integration with other disciplines. This is necessary to make the most economical use of teaching time, and to help the learner discover the relationship between industry/technology and other areas of life. The tendency to break down disciplinary lines in the elementary school is already established.

Scobey continues by describing three interdisciplinary aspects of industrial arts - that academic content of industry technology is related to many subjects; that the method of teaching industrial arts extend and support skills, attitudes and ideas learned in other curriculum areas and that skills learned in industrial arts can be used to produce instructional aids that will make learning more interesting and productive for other disciplines.

Gilbert (1965) also sees the need to strike a balance between correlating with classroom work and making a unique contribution:

> If there is no attempt to correlate with other classroom subjects it is more difficult to justify the time devoted to industrial arts activities. In the other extreme, if the only value is to provide a medium of expression, a unique contribution may be lost. A balance between correlation and the unique contribution seems to be most effective for the general education of children (p. 226).

Osborne (1965) in his article "Elementary School Industrial Arts at Eastern Michigan University" states that the integrated approach has been the major approach to elementary school industrial arts for some time:

> One important principle appears to have been in operation continuously through the years . . . It is this: Elementary school industrial arts is both subject matter and method of instruction (p. 220).

> [illegible]

[illegible]

[illegible]

> [illegible]

[illegible]

> [illegible]

There is little evidence of elementary school industrial arts being recognized as a discrete discipline. Scobey, however, in replying to a question relating to trends in elementary school industrial arts in the panel discussion noted earlier states that industrial arts is "now being recognized as a discrete discipline embracing the academic content of industry/technology."

Less emphasis seems to be placed upon industrial arts as a craft program concerned mainly with pupils just making things. There is some evidence in the literature, however, that indicates that some programs are organized about this purpose. A number of programs have adopted a unified arts approach, combining industrial arts with arts and crafts and/or home arts. One such program is that developed by the Oak Park, Illinois Elementary Schools and outlined by McMullan (1969). She indicates that such a program develops aesthetic values and manual skills in all areas without the necessity for undue repetition:

> Our unified approach to the arts also eliminates unnecessary repetition, and even conflicting methods of teachings. For example, in other schools leatherwork, ceramics and decorative metal work are often taught differently to the same students. By unified planning and instruction, both aesthetic values and manual skills may be achieved in all activities (p. 62).

She sees such a program enabling children to find answers to their design or construction problems by research, sketching and experimenting with actual materials, and in so doing develop sensitivity to aesthetic values and practice

skilful use of a variety of tools.

McWhinnie (1962) adopts a similar approach. His program is developed about a "creativity motivated" point of view:

> . . . our shop program is taught from a creativity motivated point of view. We are now conducting some experimentation in having the shop and the art teacher work in the same class as a teacher team (p. 18).

The program is basically one of woodworking and of work with hand and power woodworking tools. Emphasis is placed upon the correct use of tools and materials and the "creative feeling for design and invention (p. 18)."

Dr. William A. Downs, in a panel discussion on the nature of elementary industrial arts at the 33rd Annual National Convention of the American Industrial Arts Association held at Miami Beach, Florida in April, 1971, states that he believes there has been a de-emphasis on the craft approach:

> There has been a de-emphasis on the crafts as a significant part of the elementary school industrial arts program in recent years and I hope this trend will continue. The crafts era is over, and I look forward to an industrial/technological emphasis to become the predominant pattern in elementary school industrial arts.

Most other approaches outlined in the literature organize their programs about a blend of correlated projects designed to serve personal and recreational purposes.

Objectives outlined for this approach include safe working practices and the relating of these practices to everyday living, development of muscular co-ordination, demon-

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

strating good work habits, respecting and co-operating with others, appreciation of a job well done, expression in a large number of materials and products, correct and skilful use of hand tools to manipulate three dimensional materials, development of recreational interests and hobbies for the better use of leisure time.

Some approaches advocate numbers of these objectives, others a few. Many combine them with the reinforcement of elementary school subject matter content and/or the study of industry and the world of work.

Hoffman (1970) in describing the industrial arts program in the Centennial School District, Warminster, Pennsylvania, includes a number of these objectives:

> "To provide a richness of experience" is the primary focus of industrial arts at the McDonald School. The Industrial Arts Center is considered a laboratory where students are given an opportunity to explore and experiment with the technological and aesthetic aspects of their experiences in the classroom. An area in the elementary school where individuals and groups of students can engage in three dimensional problem solving and creative expression . . . It should be skill using, ultimately interrelating the higher levels of the cognitive, affective and psycho-motor domains (p. 113).

He lists the following objectives of the program, each being fulfilled in a variety of ways through experiences in grades K through 6.

- The child will experience historical processes that have contributed to the development of our technology.
- The child will experience a variety of current industrial methods, including the line production technique, use of jigs and

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

fixtures, and the interchangeability of parts.

- The child will develop a critical and questioning attitude toward the quality of architecture, textiles, furniture, etc. within his environment.
- The child will value craftsmanship, strive to improve his own craftsmanship abilities and develop a sensitivity to the craftsmanship displayed by others.
- The child will seek unique personal solutions to problems relating to industrial arts.
- The child will develop an affection for materials and a respect for tools and machines.
- The child will experience a variety of craft activities.
- The child will develop meaningful perception of form, space, light, colour, texture and other important human insight.
- The child will develop skill in using tools.
- The child will explore and experience works produced by contemporary scientists-engineers-artists.
- The child will be aware of the role of the industrial artist in our technologically-orientated society.
- The child will develop respect for material and natural resources (p. 114).

Steeb (1969), in making an evaluation of the problems involved in supervising elementary school industrial arts, lists the following as being the anticipated outcomes as a result of industrial arts experiences in the elementary school:

- The pupils participate in planned activities and experiences including the construction of projects related to and reinforcing the elementary school subject matter content and related to recreational and personal purposes.
- Pupils demonstrate the correct and skilful use of basic hand tools to manipulate three-dimensional materials.

- Pupils can identify materials commonly found in the home and school.
- Pupils demonstrate good work habits, including pre-planning and organizing the activity, caring for equipment and materials, respecting and cooperating with associates, cleaning up, and completing a task once it is started.
- Pupils can identify and differentiate a wide variety of occupations.
- Pupils have developed recreational interests and hobbies for the better use of leisure time.
- Students exhibit safe practices with tools and can relate safety to broad areas of living.
- The pupils demonstrate muscular coordination and the release of emotional tensions through active participation with tactile materials.
- Pupils solve problems by constructing group and individual projects.
- Construction and manipulative activities develop a need for the pupil to seek further information through reading resource materials (p. 246).

Williams (1964) states that "the industrial arts program in the elementary school should make learning more effective and meaningful for children while providing for individual differences (p. 21)." He lists a number of objectives for elementary school industrial arts. From these he singles out the development of an appreciation of industry as "one of the major and unique objectives of industrial arts in the elementary school (p. 21) and adds that the reinforcement of basic subject matter is an equally basic objective. He cites specific programs which emphasize each one of the following purposes:

- The development of an understanding of the industrial nature of society.
- The provision for experiences of children to express themselves in a large number of mat-

erials and products.

- The provision for opportunities for the students to think through problems.
- The provision of experiences to help the students become acquainted with tools and materials commonly used.
- The provision of a method of expression in general or basic elementary subjects.
- The provision for opportunities for children to develop muscles and to release emotional tensions.
- The provision of experiences to help children develop socially (p. 21).

This review of the literature relating to the purpose and nature of contemporary elementary school industrial arts indicates the wide variety of approaches being implemented in the United States. A number of purposes can be identified, the most significant of which include: Expression with a large number of materials, psycho-motor development, avocational and recreational interests, recognition of abilities, social development, consumer knowledge, study of industry, occupational training, safety, study of tools and materials, reinforcement of basic subject matter.

Of these, major emphasis in the literature is placed upon the study of industry, the world of work, and the reinforcement of basic subject matter in the elementary school curriculum. Craft and project oriented programs are giving way to programs centred about industry/technology, drawing subject matter from either the existing elementary curriculum in an integrated approach to learning or developing as a separate discipline, having its own content, and relating to other areas of the curriculum. Further, there appears to be

a recent movement away from emphasis upon understanding of industry-technology through a study of the world of work towards the development of occupational awareness, industry/technology serving as a tool for this purpose.

Inconsistency in terminology was evident, especially with respect to "industry" and "technology." Hootes (1968, p. 7) for example, states that "through the study of technology, pupils develop an awareness of the wonders of life" and in the next paragraph speaks of the study of the "elements of industry."

Towers, Lux and Ray (1966) recognize this, stating that the "loose usage of the terms 'technology' and 'industry' is at the root of the terminological problem" in industrial arts (p. 30).

The most recent references made to content in the literature use the term "industry/technology." This term will be used to describe content relating to industry and/or technology for the remainder of this chapter.

The Content of Industrial Arts in the Elementary School

In reviewing the purpose and nature of current elementary school industrial arts programs, it was found that some programs emphasized the study of industry/technology; others industry/technology with an emphasis upon the world of work and still others which emphasized occupational awareness in the study of industry/technology.

Many programs cited the supportive role industrial arts supplied either as a means of better understanding industrial elements already contained in the existing curriculum or as a means of acquiring concepts in other subject areas through concrete, three dimensional experiences. Other programs, while in the minority, emphasized craft activities and selected projects designed to serve personal and recreational purposes.

The content, or subject matter taught, is obviously influenced by the basic purpose of the program. Many programs, however, even though they purport to have a common purpose, vary in content, thus reflecting the different emphasis placed upon subject matter in achieving their purposes.

Babcock (1961) recognizes the existence of these different types of activities and attributes the differences to the personal philosophy of the people involved:

> Within these various plans can be seen still different types of activities. The overall administrative set up does not seem to determine what shall be done. More often, it is the personal philosophy of the people involved (p. 38).

In describing what children do in elementary school industrial arts programs, he points out that some programs encourage children to construct items of particular interest to them, or sometimes, their teachers; others favour an art and craft approach and emphasize manipulation and experimentation with many media. All children have identical experiences and there is usually little, if any, relationship of what is being done to the general curriculum, although some

[illegible]

programs purport to tie in with other studies in the classroom. A further group of programs, at the other end of the scale, emphasize construction activities which support or bolster classroom studies. He sees children in these programs working on projects which grow out of the curriculum. There are accompanying manipulative skills involved and a variety of materials used. The emphasis, however, is on curriculum enrichment. Within these extremes, he identifies programs with varying degrees of each of the mentioned approaches.

In programs centred about the understanding of industry/technology, a wide diversity in content is evident.

Jackman (1970, pp. 325-326), for example, sees industry being studied in a "two pronged" approach. One approach is concerned with the types of industries and the second with the activities of industry. He identifies four basic types of industries -- raw materials, manufacturing, distribution and service. Within these industries he isolates six activities -- development and design, purchasing, manufacturing and processing, internal finance and office services, industrial relations and marketing. Using this framework as a basis, he then develops a series of units which comprise the content of his "industriology in the elementary school" program. Some of these units are: The Development of Industry, Family Industries, Division of Labor, Mass Production, Raw Materials, Activities of Industry, Industrial Economic Cycle, Transport, Communications.

Heckman and Barrington (1970) in outlining the

Elementary Industrial Arts Project in Bertie County, North Carolina, identify five basic areas of "industrial technology" which have been explored by pupils in the program: power, communications, transportation, construction and manufacturing.

Hauenstein (1969) in reviewing a new and broadly conceived industrial arts program for grades K-6, which was developed during an NDEA Institute for Advanced Study, held at The Ohio State University in the summer of 1968, outlined the following instructional scheme which was designed to "help American youth understand how industry produces the man made world (p. 139). The group, made up of elementary teachers, principals, supervisors, specialists and teacher educators, defines industry as "that sub-element of the economic institution which substantially changes the form of materials to satisfy human wants for goods (p. 140)" and then sees construction and manufacturing as two broad areas which are involved in changing the form of materials:

> The two gross systems for producing material changes are specified as construction (on site) and manufacturing (in plant). These two systems for effecting changes in the forms of materials provide the content of the curriculum. Bakeries, printing establishments, canneries, meat packers, textile mills, road building, bridge building, landscaping, oil refineries, sewage plants and chemical producers are included as examples of construction and manufacturing which substantially change the form of materials to satisfy human wants for goods (p. 140).

They consider activities such as marketing, transportation and communication as not substantially changing the

[illegible]

[illegible]

> [illegible]

[illegible]

form of materials and hence fall outside the area to be studied. The products and structures used in these service activities fall within their definition, however, and therefore it was appropriate to include them.

They then identify a number of "common processes" for the production of any manufactured product and any constructed product. These common processes were then arranged into a sequential order, the stages of which provide a "story" of changing the forms of materials. The story of manufacturing and the story of construction were then used as the framework for deriving content.

According to Gilbert (1965) "children can learn the chief characteristics of materials used in factories, the processes by which materials are formed and the operation of the tools and machines (p. 226)" by studying industrial processes. He contends that the basic industrial processes can be determined by studying the statistics provided in the quarterly publication of the United States Department of Commerce, Survey of Current Business. The processes, thus identified, can then be labeled to fit into a curriculum pattern. He sees manufacturing, transportation, construction, communications and power as being examples of typical sections to be studied.

For Earl (1967),"the inclusion of industrial-technical activities increases the opportunity of the elementary school environment to reflect the kinds of abilities and talents required in a technical society (p. 33)." He

envisages an approach which encompasses a study of "selected industrial concepts and their applied technical experiments (p. 33)" and sees these industrial concepts being represented through activities involving a study of transportation, power, communication, manufacturing, construction, mass production, automation. The applied technical experiments would be represented through "kits, mock-ups, models and visual aids (p. 33)" and would include crystal radio, electric motor, combustion engine, digital computer, steam engine, plastic forming, ceramic extrusion. Earl sees this type of program as an "adjunct to the present elementary industrial arts program" offering a "more sophisticated approach to presenting technology to children (p. 33)." He doesn't, unfortunately, offer any suggestions as to what the present industrial arts program happens to be! He does, however, see his approach providing among other things, occupational information and proper attitudes towards the world of work.

Hackett (1965) feels that an "industrial element" should be added to the "humanistic and scientific element" already in the elementary school curriculum. Such an element he contends should include "agriculture, mining, construction, transportation, communication, trade, and the services as well as the manufacturing industries (p. 228)." Taken overall, these elements constitute the world of work -- "the activities at which man spends more than one third of his waking hours (p. 228)." He sees the content of the program emphasizing a study of industries and occupations in general.

[illegible]

and the manufacturing industries and occupations in particular. Baillargeon (1970) notes that elementary level industrial arts is a part of a kindergarten-grade twelve program (p. 49)" and that the aims for the elementary school involve "orientation to the nature of work" and "exploration with tools." He lists the following activities as those in keeping with the purposes of such a program:

> Work Environment-Activities focus upon the concept of 'work' as a fundamental 'good' for the individual and society.
> Service-Activities support the concept that employment in-service functions make a contribution to society.
> Manufacturing-Activities center on the division of labor into specialties which permit the efficient mass production of products.
> Communications-Activities focus on the media used to control, extend and give permanence to mass communications.
> Power-Activities are based upon the application of machines to convert energy into useful work.
> Construction-Activities relate to the structures in which people live and work.
> Transportation-Activities center on the vehicles and facilities used to transport people and goods (p. 50).

Dresser (1969) sees industry/technology as it relates to the world of work involving a study of related occupations. To him, a unit on construction will serve to identify a number of occupations:

> The current responsibilities, level-of-entry preparation and pay scale for general contractors, laborers, engineers, masons, carpenters, steel workers, electricians and draftsmen must be considered, along with occupations just emerging in the labor market (p. 218).

He suggests that additional topics which could be studied in a unit on construction could include:

> . . . site selection, measuring, instruments, construction plans, foundations, prefabricated building materials, insulation, air conditioning, heating, plumbing, landscaping, earth moving equipment, etc. Historical study of man's building progress should be included (p. 218).

Dresser does not indicate which other units could be included in the elementary school industrial arts program. Other units -- transportation, power, communications, manufacturing are a few -- have been mentioned elsewhere in the literature. Only passing reference is made to suggested topics or activities covered within these units and then frequently only in terms of a specific activity. Hauenstein (1969) like Dresser, identifies activities within the units of construction and manufacturing. He notes that seventy-two major concepts were identified by the NDEA Institute for Advanced Study from the "common processes" identified in construction and manufacturing. They suggest behavioral objectives for each concept, and a related activity and indicate that each activity should be capable of completion in one hour. Earl (1967) has this to say about the development of a unit on electricity:

> It could include the conversion of electric power into mechanical power. A further delimitation would organize the material around the electric motor. The electric motor could be represented by numerous subdivisions such as: frame, name plate, magnetism, wires, field coil, armature, brushes, bearings, series wound and parallel wound. Each of these sub-divisions could be further sub-divided to present specific details clearly. For example, name plate could be sub-divided into horse power, cycles, volts, and amperes (p. 34).

From the diversity and number of topics included in these examples, the investigator assumes that there is obviously a wide variety of approaches to specific content and that activities and products actually used in the classroom in dealing with the large unit areas are indeed determined by "the personal philosophy of the people involved (Babcock (1961), p. 38)."

A similar break-down of content into units of instruction is evident when industry/technology is recognized as serving a supportive or integrated role in teaching other subject fields within the elementary curriculum. Those who see the industry/technology approach to industrial arts playing a supportive role, identify those units relating to industry/technology which correlate with units already described in other elementary school subject fields. Gilbert (1965) sets up sections for manufacturing, transportation, construction, communications, power and "others" and says:

> This division of industrial processes is particularly successful for correlation with elementary school classroom work. Social studies, science, and language arts use units described by one of the five titles; therefore, the correlation is natural (p. 226).

He illustrates this approach by referring to a number of activities conducted by the University School on the Northern Illinois University campus. Two of these examples are sufficient to illustrate how, with this approach, industrial arts activities grow out of instruction in other subject fields:

> The first-graders had completed a science unit on wind and air when an activity in glider construction was introduced. This reinforced their learning about air, provided measuring practice, and introduced the appreciation of air transportation.
>
> Graphic communications was the principal activity for a fourth grade class. Their social studies unit called for making maps of Illinois. The children used them to label the principal cities, rivers, manufactured goods, agricultural goods, and population. They screen printed five different color maps so each child had his own map to label. After the maps and a cover with an original design were completed the children used plastic loops to bind them into a book (p. 227).

Ivey (1970) describes industrial arts as "manipulative activities, closely correlated with basic subjects being taught in grades K-8 (p. 105)" and like Gilbert, cites examples of the activities growing out of work in other subject fields.

Olsen (1963) lists specific subject matter for industrial arts in the elementary school but suggests that the arrangement of the subject matter is not fixed and that it should be arranged to correlate or integrate with other school subjects. He divides the elementary school into three levels when outlining his suggested content -- the primary grades, the intermediate grades, and the upper elementary grades. For the primary grades, he suggests content should centre about technology and the home; for the intermediate grades, about technology and the community and for the upper elementary grades, about technology and the world.

Thrower (1967) contends that industrial arts activities

should be incorporated into units being taught in other subject fields, but emphasizes that it should not be subjugated by other areas of the curriculum:

> . . . I believe industrial arts should take its rightful place as a contributor to the overall curriculum. Under the unit method, just as there would be science-centered units and social studies centered units, there should also be technology centered units (p. 96).

Both Scobey (1966) and Hootes (1968) strongly advocate this integrated approach, seeing industrial arts as both content and method, drawing its subject matter from other subject fields but making a unique contribution to the overall elementary school curriculum. Scobey identifies five categories from which content can be drawn -- food, clothing, shelter, transportation and power, and communication. She sees the most effective way to introduce industrial processes is within the social studies unit "because of the close relationship of industry to the social sciences and to all phases of man's life (p. 26)." The selection of content and activities with the categories suggested should be carefully made:

> To make choices in content, teachers need to clarify their purposes for each experience; they need to be conscious of why the material was chosen. Teachers must make choices based on whether the activity is worth the time and effort, on the amount of learning that takes place, and on the relationship of this learning to the total educational program (p. 27).

She makes no reference to specific content but emphasizes the value of carefully chosen industrial arts experiences to other subject fields.

Hootes (1969) identifies industrial arts, a "study

of industrial technology," as a subject matter discipline having a body of knowledge "distinct and unique in its own value" and having a close relationship with other areas of the elementary school curriculum. He identifies references made to industrial technology in elementary textbooks for the North Carolina public schools under the following five classifications: manufacturing, construction, communications, power and transportation. Under these major headings, a comprehensive outline for grades one through eight was developed. He points out that the "curriculum" could lend itself either to a correlated, integrated or separate subject approach. In an earlier publication, however, (Hootes, 1968) he nominates his preference for an integrated approach:

> Industrial arts at the elementary school level is not another subject to be added to an already crowded curriculum; it should be an integral part of the already established curriculum -- an enrichment to that which we now have (p. 10).

He emphasizes the importance of integrating the program with other subject areas of the elementary school because he sees other subject areas attempting to reflect the nature of contemporary society, and in so doing, they in turn reflect technological aspects of present day society.

In outlining current thought relating to the purpose and nature of elementary school industrial arts programs, a number of approaches were identified which saw industrial arts having no specific content, acting merely in a supportive capacity to bring greater understanding to subject content in other fields through three dimensional, manipulative

experiences.

Duncan (1963) advocates this approach:

> Working with constructional materials and using tools and processes, the clever teacher can cultivate interest in a study of these basic needs and exact some performances from the children to promote reading, writing, speaking, and other regular subjects (p. 19).

Zimmerman (1963) stresses that "construction activities" should be related to what is being done in the classroom. He feels, also, that these activities should be flexible enough to cross subject matter lines and in so doing help the child to learn "to his fullest extent." He sees construction activities of industrial arts involved in many areas:

> Industrial arts activities can be involved in many areas studied in the elementary school, i.e., science (weather, plant life, bird life, simple machines); social studies (transportation, community workers, farming, lumbering, Indians, early America); mathematics involved in measuring and figuring materials used in construction; language arts (writing, speaking, listening, reading), can be involved in research and in giving oral and written reports on findings. Many areas of learning can be involved and interrelated to one another (p. 16).

Meyer (1967), in describing the Enrichment Through Industrial Arts program in operation in Kansas City, Missouri, cites the main reasons for having the program are to "motivate further study, clarify thinking, and create new interest in regular classroom work (p. 56)." The content of the program is derived from classroom studies and is developed around a number of units taken from most areas of the curriculum:

> Science is the most often requested area and we have units on birds, electricity, insects, light, plant propagation, rocks and minerals, simple machines, solar systems, sound, trees and shrubs, and weather. The area of social studies includes units on transportation, the Old World, and pioneers. We have projects for units in mathematics, health, art, and service projects such as Science Fair, puppet stages, and chart racks (p. 57).

The arts and crafts approach appears to provide plenty of activity but little industry/technology or correlation. References in the literature to this approach to industrial arts in the elementary school are not recent or, if they are, tend to relate activities more towards the development of personal and recreational purposes.

The Oak Park Elementary Schools, Illinois, unified arts program described by McMullan (1959) is an example of this older type program although the City School District in Rochester, New York operated a "three arts" program (industrial arts, art, home economics) only recently. The emphasis in these types of programs is on uniting teaching processes and diversifying activities:

> Although the skills needed to carve a wooden object are different from the skills involved in machine sewing, results are judged in the same manner. Sensitivity to the aesthetic values of form and colour can be developed as one selects colors and fabrics for a skirt, or molds clay into a pleasing shape, or arranges type for a poster, or sketches a design for a wooden box (McMullan, 1959, p. 62).

A similar type of program is described by McWhinnie (1962) who sees the industrial arts program at the Laboratory School at the University of Chicago as being taught from "a creativity motivated point of view." He describes experiences

offered in ceramics, printing, sculpture, and metal but indicates that the program places emphasis on "the problem of design in wood." Projects such as bowls, lamps, boats, planes, book shelves, trays, involving sawing, sanding, squaring, planing, and finishing involve the large part of the program with "variations as to size, wood, surface, shape, and final appearance "being decided upon by each child."

Babcock (1961) sees the arts and crafts approach placing emphasis on manipulation and experimentation with many media.

"Usually, a part of this type of program includes basketry, boondoggling (working with lacing materials), clay work, weaving, and other "crafty" experiences. All children have identical experiences and there is usually little, if any, relationship of the work to the general curriculum. Through rationalization, there is often said to be a tie-in with the studies of the classroom. ("We learned more about the Japanese people by making ash trays and decorating them with Japanese designs.") (p. 39).

Hoffman (1971) emphasizes a "richness of experience" and does not set down specific content or activities. Pupils work on problems which are meaningful to them. No set classes are scheduled. The children attend either by appointment or spontaneously. Activities involve experiences with "plastics-acrylics, co-polymers, polyesters, woods, metals, tri-wall cardboard, styrofoam, cement, paper, graphics-letter press, block and silk screen printing, textiles (weaving and sewing)

and ceramics (p. 114)."

The review of the literature relating to the content of industrial arts programs in the elementary school illustrates clearly the lack of concensus as to what even broad areas of content should be even amongst programs which purport to have similar objectives. Those programs which advocate study of industry/technology while agreeing on content relative to very broad areas of study, often disagree as to specific content within these areas. There is little evidence in the literature, other than specific examples, of how these broad areas of description can be broken down into experiences relevant to the classroom with the exception of only two examples.

One such description was made by William R. Hootes at the East Carolina University, Greenville, North Carolina in August, 1968. His study entitled "The Development of a Course of Study for Industrial ARts Education at the Elementary School Level" involved the development of a course of study for industrial arts in grades one through eight, which was based on material present in state adopted basal textbooks. Instruction resulting from this course of study was to serve six functions: social, cultural, consumer, recreational, occupational and technical. It extracted and organized material from the texts and developed a course of study keyed to these texts and reference materials. The other description was that developed during an NDEA Institute for Advanced Study held at the Ohio State University in the

summer of 1968. This program for grades K-6, centred about construction and manufacturing. A number of common processes were identified for the production of any manufactured products and any constructed project. Thirty-six major concepts were identified in each area. Seventy-two activities for each grade level (36 for manufacturing and 36 for construction) were designed and engineered to "bring about behavioral outcomes representative of the major concept (Hauenstein, 1969, p. 141)."

Meyer (1967) in setting down a number of "prepared" units derived from classroom studies makes the only attempt to specify content where industrial arts activities are seen to grow out of the elementary school curriculum. Other authors who advocate this approach merely cite one or two examples from each subject field.

Art and craft and personal and recreational purpose programs place emphasis on activity in a variety of materials. No evidence is available in the literature of specific content being suggested, the personal philosophy of the teachers involved determining the content.

Instructional Factors Involved in Elementary School Industrial Arts

An examination of the literature thus far has reviewed current thought relating to the nature and purpose of industrial arts in the elementary school together with a description

of the content of programs as authors see it relating to these various purposes.

The remainder of this chapter will be concerned with an investigation of the literature with a view to identifying the manner in which content is used in elementary school industrial arts programs. Within each program, the application of specific content depends a great deal upon in which direction the sensitized teacher feels her pupils should be moving and, in the case of specific activities, what the particular pupil (or pupils) considers important. It is proposed, therefore, to emphasize those instructional factors which relate specifically to the role of the classroom teacher and/or the industrial arts consultant, and the format in which content is presented to the class.

The Role of the Classroom Teacher and/or the Industrial Arts Consultant

The literature identifies several schools of thought as to the role of the teacher and the specialist teacher in the elementary school industrial arts program. One school of thought sees the program capable of being run by the classroom teacher if the teacher has had specialized instruction in the use of tools and materials and how to use industrial arts activities effectively in the classroom.

Thrower (1967) strongly supports this approach, seeing the classroom teacher as being the key to successful industrial arts activities for several reasons:

> First, she, with the help of curriculum specialists, is the person who determines what actually should be in the curricula which will be presented in her classroom. Second, she knows the individual characteristics, needs, desires and aspirations of the children in her classroom better than anyone else. On the basis of these two factors, she is in the best position to put the pieces of the puzzle together so that the most meaningful learning experienc possible will result (pp. 196-197).

Miller (1962) feels that before industrial arts can yield the maximum educational benefit to the learner the teacher must select each activity:

> (1) . . . in terms of student capabilities, readiness, and interest as well as its potential value to the unit being studied, (2) see that it is adequately planned, (3) instruct and direct the students through the successful execution of the plan and (4) conduct such summarizing activities as necessary to insure effective learning (p. 21).

He sees the classroom teacher being capable of doing this if training is provided in "planning, tool processes, material usage and, most of all, correlation at the elementary level (p. 21)."

Ivey (1970) and Giovannoni (1964) indicate that the regular classroom teacher has the responsibility for conducting the elementary school industrial arts program in Bertie County Schools, Windsor, North Carolina and the Los Angeles City Unified School District, Los Angeles, California, respectively, although Ivey adds that it "might not be ideal, but it works very well for us (p. 105)."

Earl (1967) considers that elementary school indus-

trial arts is in "a fluid if not confused state (p. 32)" and suggests an "elementary school industrial technology program" developed around "selected industrial concepts and their applied technical experiments (p. 33)." He sees the industrial arts teacher or the consultant as not being absolutely necessary for the success of the industrial technology program he outlines and indicates that a short workshop is all that might be needed to "enable the elementary classroom teacher to become acquainted with the selected instructional materials and applied experiments (p. 34)." Williams (1964) agrees with Earl. He feels that elementary teachers alone, or with the aid of a consultant, can effectively use industrial arts activities to "vitalize programs in the teaching of basic subject matter (p. 23)."

By far the greatest number of writers support an approach which sees the elementary teacher supervising the classes but working in consultation with an industrial arts specialist in planning the program. There appear to be differences of opinion as to the function of the industrial arts consultant, however. Wonacott, Giovannoni, Hendrick, and Boyd (1964), for example, see the program taught in the classroom by the regular classroom teacher, who calls in specialized help only when she feels she needs it. Similarly, Van Deusen (1964) places the classroom teacher at the core of the educational program, being responsible for the total curricula of the child. He sees the function of the industrial arts consultant as being to aid her in the manner she feels

[illegible]

will best serve the needs of her class. Lownsbery (1967) places the industrial arts "specialist" in the same role, seeing him providing guidance and materials when requested by the elementary classroom teacher.

Dresser (1969) in outlining a unit on construction for the elementary school sees the consultant acting in an advisory role with respect to the selection of subject material:

> . . . it is unrealistic to expect the elementary school teacher to have sufficient background experience or information of the area of construction to be solely responsible for the selection of appropriate material for inclusion in this unit (p. 216).

Unlike Wonacott, et al., Van Deusen and Lownsbery, he feels that, even with adequate training, the elementary school teacher should consistently plan her work with the consultant.

Raffaelli (1971) further emphasizes the constant involvement of the industrial arts consultant in outlining the role of the full time industrial arts consultant in Reading School District, Pennsylvania:

> The role of this consultant consists largely of assisting teachers responsible for developing and teaching the curriculum. Primarily, he aids by assisting teachers in obtaining tools, materials and designing suitable experience activities. Also, the consultant can greatly aid classroom teachers by conducting workshops and in-service programs where teachers can develop their competence and self confidence in the use of tools and materials. He also assists by serving as a sounding board for teachers' ideas and plans, and by offering technical advice which will greatly increase the teachers' chances of success (p. 122).

In addition to these functions, Raffaelli sees the industrial arts consultant providing technical information, reviewing teachers' ideas, offering unit suggestions, demonstrating tools, materials and processes and, when invited, assisting with classroom activities. He emphasizes that the classroom teacher is retained as the key person in the program.

Both Kazarian (1963) and Gerbracht and Gilbert (1958) see the industrial arts consultant serving a similar involved role in planning and presenting the industrial arts program. Gerbracht and Gilbert advocate that industrial activities should be under the guidance of the classroom teacher but that the classroom teacher should always work closely with the industrial arts consultant. They see the industrial arts consultant performing a number of specific functions, the most significant of which is co-ordinating and participating in classroom activities:

> The consultant should serve primarily as a helping teacher, resource person, and co-ordinator of industrial-arts activities (p. 201).

Kazarian further emphasizes that programs should be developed through the combined assistance of teacher and consultant but suggests, as well, that the consultant should present the program to the teachers and pupils.

Specialist teacher involvement in planning and presenting activities is more pronounced where industrial arts activities are carried out in special surroundings. Often, a series of industrial arts units are developed about the

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

regular classroom activities and when the teacher considers it relevant to tie in with the regular classroom program, or, more often, at set periods during the week, children move to the industrial arts complex where the industrial arts specialist is responsible for presenting the activity. Meyer (1967) in describing the Enrichment Through Industrial Arts program in Kansas City, Missouri, illustrates this approach:

> Each class meets one period a week, 1 hour and 20 minutes; most units take 10 to 14 weeks for completion. With 3 or 4 classes a day, each working on a different unit, much preparation is required of the consultant (p. 56).

and further:

> We [the consultants] actually teach the unit, completing the manipulative activities in the industrial arts shop, with the regular teacher present (pp. 56-57).

Another program which uses special facilities but has no set activities or time scheduling is that conducted in the Elementary Industrial Arts Center, Centennial School District, Warminster, Pennsylvania. In this program, the industrial arts specialist serves as a resource person or consultant to the children for "working out solutions to their own problems (Hoffman, 1971, p. 113)." Hoffman stresses that the program is not based on teaching a predetermined body of knowledge, but rather that of working on problems "that are meaningful to them and related to activities in their regular classroom (p. 114)."

In summation, there appear to be three broad schools.

of thought as to the role of the classroom teacher and/or the industrial arts consultant in the elementary school industrial arts program. One group of writers see industrial arts as being classroom centered with the classroom teacher being responsible for activities, only calling upon specialized assistance when she considers it absolutely necessary. Another group includes an industrial arts consultant. Most writers see his role as that of a resource person although some would see him assisting the teacher in the classroom during the presentation of lessons. The industrial arts consultant/classroom teacher combination, with both working together to plan and present industrial arts activities, seems to be the most popular approach. The third school of thought involves an industrial arts specialist who works with children in an industrial arts laboratory on a regularly scheduled basis.

Ivey (1970) recognizes these three schools of thought and describes the broad characteristics of programs which follow the three different approaches in his report for the committee on implementation of elementary school industrial arts published as part of the proceedings of the 32nd Annual American Industrial Arts Association Convention held in Washington, D.C., 1970. He describes the program directed by the classroom teacher as the Limited Classroom Program, the program in which the classroom teacher directs the work in close cooperation with a specialist as the Comprehensive Classroom Program and the program in which the industrial arts

teacher directs the activities as the Laboratory Program.

The Format in Which Content is Presented to the Class

The literature makes numerous references to the way in which program content is disseminated to the pupils, especially with respect to the organization of subject matter and when it is to be presented.

Earl (1967), for example, suggests that a "structured content continuum" following successively from year to year could perhaps be the best approach to organization of content:

> The well structured applied technical experiments will also provide a realistic opportunity for the pupils to develop appropriate work habits, beginning technical skills and proper attitudes toward the world of work (p. 33).

Nothdurft (1967) outlines a unit approach to the organization of subject matter. He points out that "literally hundreds of different projects were made from math aids to weather instruments" by Grades Five and Six in the Elementary Industrial Arts Enrichment program in Kansas City, Missouri. Each project relates to a unit and each unit in turn relates to one of the many subject areas in the curriculum. He suggests that no sequence is followed. The unit is selected from those available and introduced at the appropriate time. Duncan (1963) recommends a similar approach to the organization of subject matter but, unlike the program described by Nothdurft which sets aside one hour twenty minutes per week for industrial arts, emphasizes that

"construction work" should not be done on a rigorous schedule. Rather he sees it being introduced when the children are ready for it, so that it "stimulates the unit content and becomes an integral part of the learning experiences (p. 19)." To him, construction activities should be used regularly or frequently at the teacher's discretion.

The curriculum developed during an NDEA (National Defence Education Act) Institute for Advanced Study, held at Ohio State University in 1968 recommends a tightly knit organizational pattern for the presentation of subject matter. The organizational pattern was developed around one hour of instruction per week in each of the areas of construction and manufacturing. Working on a thirty-six week school year, seventy-two major concepts, thirty-six in manufacturing and thirty-six in construction, were developed for each grade level. Activities were designed to bring about specific behavioral outcomes representative of each concept. Specific sequence was emphasized.

Dresser (1969) favours the unit approach but speaks of large (in content) unit areas and not in terms of specific activities centered about a product as does Nothdurft (1967) and Duncan (1963). Within these large units, he emphasizes that no attempt should be made to "reduce the content to any particular grade level of the elementary school (p. 217)." He feels that this, together with "selected related subject matter content" should be left to the "elementary school specialist."

Passing reference is made elsewhere in the literature to the organization of subject matter for presentation. Most writers speak of "units" of subject matter but differ as to the content of the units they describe. Some, as previously pointed out, see the unit as a small isolated activity developed about a specific concept or understanding while others relate it to a broad area of subject matter. There is some evidence that the time available determines the content and number of units to be presented. With one or two exceptions, little emphasis is placed upon relating subject matter to specific grade levels. Rather, more emphasis seems to be placed upon keeping the organizational pattern flexible both in terms of what is to be presented, when it is to be presented and for how long.

Summary

Conclusions relating to each of the areas investigated in the review of the literature have been made at the end of each of the sections in this chapter. The purpose of this final section is to give a general overview of the literature reviewed and to make an overall summary within the total frame of reference.

An examination of the literature relating to the evolution of concepts regarding the place and function of industrial arts in elementary education in the United States reveals that educators have long recognized the value of

activities involving doing, making, manipulating and using things in the educational program of elementary schools. Since before the turn of the century sporadic attempts to include industrial arts in the elementary curriculum have been initiated. Some approaches have withstood the ravages of time, but not without many changes in purpose and content. Others have faded away. During the past ten years a nation wide re-awakening to these values as they are achieved through industrial arts programs has become evident. The increase of literature written on the subject and the publicity given to numbers of elementary school industrial arts programs attests to this.

Steeb (1969) identifies a number of factors which he considers has contributed to this recent impetus to add industrial arts to the elementary school curriculum in the United States. They are:

> 1. the increasing variety and quality of the elementary literature,
> 2. major, funded research projects and teacher institutes,
> 3. the emphasis on industrial arts sequence which includes K-12, vs. 7-12,
> 4. the concern of vocational education and the vocational amendments for exploratory programs and occupational orientation in the elementary school, and
> 5. an increased awareness by elementary educators to individualized instruction and the recognition that all children do not learn from the same stimulus or method and that activities enrich and motivate learning (p. 245).

The literature reveals that recent advocates of industrial arts in the elementary school see it serving a number of purposes, variously combined. The most significant pur-

poses identified in the literature include reinforcement of academic units, motivation of pupils to learn, enrichment of learning situations, increasing desired outcomes, providing for a basis for understanding and appreciating the cultural heritage and the world of work and aiding in the development of manual dexterity.

Further, a host of terms is used to identify the activities involving tools, techniques and materials. Three schools of thought can be identified.

One sees industrial arts as a body of subject matter which should be taught in the same manner as english, history, geography, mathematics. Advocates for this approach see industrial arts as a content continuum from K-12 with information and experiences scaled down to fit the needs of the elementary school.

Another thinks of industrial arts as an activity method of teaching with no specific content and no required experiences or projects. The activity is used to solve problems which grow out of regular school subjects. Industrial arts is thought of as a means or method by which the elementary teacher is better able to achieve his or her goals. Some of the terms used to describe this approach are arts and crafts, handicraft, integrated handwork, construction activities, and manipulative activities.

The third school of thought is a compromise which regards industrial arts as having both content and method. Specific content relating to industry/technology is integrated

with regular class activities. No special time is set aside as activities are part of the overall learning process. This concept has been identified as creative arts, practical arts and industrial arts. Industrial arts is most often used (Deck, 1969, p. 251).

It is most evident that there is clearly a lack of concensus relating to content within industrial arts programs in the elementary school, even amongst those programs which have similar objectives. Those programs which advocate a study of industry/technology, for example, show agreement on content relative to very broad areas of study but often disagree as to specific content within these areas. The literature contains little evidence of how these broad areas are broken down into experiences relevant to the classroom. Rather, more emphasis seems to be placed upon keeping the organizational pattern flexible both in terms of what is to be presented, when it is to be presented and for how long.

Finally, many statements are contained within the literature which are concerned with who shall teach industrial arts in the elementary school. Some writers see it being the regular classroom teacher with some preparation in industrial arts while others see it being the responsibility of a specialist whose major training is in the field of industrial arts education.

In summation, the review of the literature has revealed that there are a variety of approaches to industrial arts in the elementary school system in the United States.

This is particularly evident with respect to objectives, content and teaching methods. No one approach appears to be more successful or acceptable than any other, with, perhaps, the exception of the study of industry/technology as an integrated part of the total elementary school curriculum. As well, recent literature suggests that there has been a decline in the art and craft approach which places emphasis on manipulation and experimentation with many media.

Common elements relating to objectives, content and teaching methods are evident but the variety of approaches, variously combined, make it difficult to identify them.

The literature reveals that a number of programs have been described from time to time. There is no evidence of programs being compared, especially with respect to identifying common elements.

CHAPTER III

SELECTED CONTEMPORARY PROGRAM DESCRIPTIONS IN ELEMENTARY SCHOOL INDUSTRIAL ARTS

The preceding chapters revealed the plan for the research and illustrated the current thought about the approaches, movements and programs that was prevalent in the literature. This chapter will explain the method in which the selected programs were identified and describe these programs with respect to development, objectives, and operational aspects together with a number of examples of typical activities.

Identification of Selected Contemporary Programs in Elementary School Industrial Arts in the United States

In Chapter I, the criteria used to delimit this study were listed. They include stipulations that the program is ongoing or has been at the experimental and testing stage within an elementary school or schools for at least a full school year and that descriptive material concerning the program was available in the form of articles or printed releases.

Dr. W. A. Downs, Central Missouri State College, Warrensburg, Missouri, the National Treasurer, American Council for Elementary School Industrial Arts (ACESIA),

supplied a list of past and present executive officers of that organization. A complete list of these officers is included in Appendix G. A letter similar to the example in Appendix B was sent to the ten officers asking them to nominate ten elementary school industrial arts programs they each considered to be the most significant in content and purpose and which satisfied the selection criteria outlined above.

Eight of the officers responded with lists of programs. Twenty-six programs were nominated which satisfied the pre-established selection criteria. These programs were listed and their frequency of nomination noted. Twelve programs were found to be nominated by two or more officers. These programs were selected, by consensus, for description and analysis.

The twelve program leaders were contacted and asked to participate in the study. An example of the letter sent to each of the program leaders is included in Appendix C. One program leader indicated that he was not prepared to participate in the study (see Appendix F). Two nominated programs, Summit County Schools, Akron, Ohio and Technological Exploratorium K-6, Hudson, Ohio, were operating under the direction of one person, Mrs. Norma Heasley, who was implementing the same program in both areas.

The remaining ten program leaders responded with descriptive material, copies of releases and listings of published articles focusing on the field. The programs, along

with the participating directors, are represented in the following list:

1) Elementary Industrial Arts, Bertie County Schools, Windsor, North Carolina. * (Bertie County Schools)	Mr. Larry T. Ivey, Director Title III, E.S.E.A. Project P.O. Box 10 Bertie County Schools Windsor, North Carolina 27983
2) Elementary School Industrial Arts, Centennial School District, Warminster, Pennsylvania. * (Centennial School District)	Mr. Donald Hoffman, I.A. Specialist McDonald Elementary School Centennial School District Warminster, Pennsylvania 18974
3) Integrated Handwork, City School District, Rochester, New York. * (City School District of Rochester)	Dr. Eberhard Thieme, Acting Supervising Director of Instruction City School District of Rochester 13 Fitzhigh Street, South Rochester, New York 14614
4) Industrial Arts Enrichment in the Elementary School, Kansas City Public Schools, Kansas City, Missouri. * (Kansas City, Missouri)	Mr. T. Gardner Boyd, Director, Industrial Arts Kansas City Public School District Board of Education Building 1211 McGee Street, Kansas City, Missouri 64106
5) Elementary Industrial Arts Los Angeles Unified School District, Los Angeles, California. * (Los Angeles City School District)	Mr. Wayne Wonacott, Supervisor Elementary Industrial Arts Career Education Service Unit Division of Career Continuing Education Los Angeles City Unified School District 632 N. Madison Avenue Los Angeles, California 90004
6) Practical Arts Activities Nova Elementary Schools, Fort Lauderdale, Florida. * (Nova Schools)	Mr. Robert G. Schaefer, Supervisor of Technical Science 3600 S.W. College Avenue Fort Lauderdale, Florida 33314

7) Project Loom, Florida State University, Tallahassee, Florida. * (Project Loom)	Dr. James R. Heggen and Mr. John J. Geil, Directors Project Loom Industrial Arts Department Florida State University Tallahassee, Florida 32306
8) Project Occupational Versatility, Highline Public Schools, Seattle, Washington. * (Project Occupational Versatility)	Mr. John Lavender, Director Project Occupational Versatility 11401 - 10th Avenue South Seattle, Washington 98168
9) Technological Exploratorium, K-6 Hudson, Ohio. * (Technological Explorator- ium K-6)	Mrs. Norma Heasley, Director Technological Explorator- ium, K-6 Title III E.S.E.A. Project 76 North Hayden Parkway Hudson, Ohio 44236
10) Technology for Children, State Department of Education, Trenton, New Jersey. * (Technology for Children)	Dr. Fred J. Dreves, Jr. Director, Technology for Children Project The Division of Vocational Education State Department of Education 225 West State Street Trenton, New Jersey 08625

*These abbreviated program titles are used on statistical data and within the body of the text in the remainder of the study whenever reference is made to particular programs.

In the remainder of this Chapter, these selected contemporary programs are described. This involved a brief overview of each program in an attempt to relate its basic development, objectives and operational structure. As each of these reviews was developed, copies of the program descriptions were sent to the respective directors for editorial suggestions and comments. These suggestions and comments were used to refine each program description.

Elementary Industrial Arts

Bertie County Schools, Windsor, North Carolina

Background

The idea of elementary industrial arts originated in Bertie County as early as 1965. At that time, parents, teachers and administrators recognized a need for a program of technical education in grades 5 through 12. This original plan did not materialize but a late revision in 1967, concentrating on grades K-8, did and was approved for a Title III grant in June of 1968.

The program received Federal approval on the basis that industrial arts for elementary schools is an innovative process in public education. A total of $310,000 was allocated to the project over a three year period.

During the first year of operation, program staff worked with twenty four elementary teachers and seven hundred and twenty elementary pupils. Concentration in the first

year was placed upon project objectives, purposes and goals, and on ways and means of achieving these.

The second year program expanded to include fifty-two teachers and one thousand, four hundred and fifty-two students.

The final year of the program under Title III E.S.E.A. funding began on July 1, 1970. An additional twenty five teachers were included in the program giving the project a total contact of 70% of the elementary students in Bertie County. The North Carolina Department of Public Instruction has been largely responsible for maintaining and supporting the project since June, 1971. Bertie County has assumed 50% of the cost at the local level with additional support coming from Title I E.S.E.A.

From the first instance, the program has been correlated with the basic elementary curriculum in Bertie County, thus utilizing the talents and abilities of classroom teachers to offer pupils a more meaningful education through the study of industry and technology.

The program employs four curriculum co-ordinators whose responsibility it is to correlate industrial arts with basic subjects. As well, they provide technical assistance and instruction to students and teachers. Co-ordinators also plan and conduct in-service meetings for participating teachers and keep all classes supplied with materials and equipment.

Since October, 1970, co-ordinator assistance has been gradually phased out. As teachers complete two years on the program, they are removed from the co-ordinators schedule and are required to conduct their activities without continued assistance. These teachers still receive assistance upon special request and co-ordinators continue to supply the class with materials and supplies. At the end of the period funded by E.S.E.A. teachers had the industrial arts training needed to carry on the program unaided except for periodic assistance by one or two supervisors who will continue to assist in correlating industrial arts with other subjects and in the supply of materials and equipment. In-service training continues for all incoming teachers in the system.

The county is also co-ordinating programs at the junior and senior high school level with the elementary school industrial arts project in an effort to provide a unified program from kindergarten through grade twelve.

Objectives

Bertie County School Board (1969) indicates that the major purposes of the program is to introduce students to the world of industry and technology and to guide them in terms of the pre-vocational, pre-professional or avocational interests. Ivey (1970a.) lists five major areas of study (power, communications, construction, transportation,

manufacturing) and points out that these areas of study will help to achieve the following objectives for the program:

1. To increase student knowledge of the technological aspects of society.
2. To increase academic achievement through nonverbal technological experiences.
3. To increase knowledge of various occupations through training in and exposure to selected occupational fields.
4. To develop intelligent consumer selection abilities (buying habits) as applied in purchasing commercial products and services.
5. To provide simulated practical experiences related to industrial activities.
6. To develop skills applicable for use in leisure time activities.
7. To increase knowledge of the effects of technology and industry on contemporary society through studying the evolution of technology and industry (p. 106).

Operational Aspects

Pupil activities can best be described under a number of major divisions. These divisions include research, study, and physical activity in technological areas of industry as categorized into (1) transportation, (2) communications, (3) construction, (4) power, (5) manufacturing and (6) services.

All these six areas originate from the basic curriculum and are expanded to include related activities or information derived from industrial arts subject matter. The uniting of textbook with activity is stressed throughout the program.

A curriculum guide, which shows correlation of industrial arts and technology with basic subjects, has been

developed for use by program teachers. Emphasis is placed upon adding interest, challenge and realism to student learning. Elementary school textbooks used throughout the country were used to obtain references to technology and the industrial society of America and the World.

The guide is organized to assist teachers to more effectively utilize these references for the benefit of pupils. It is divided into sections relating to special education, kindergarten, and grades one through seven. Each section contains a textbook bibliography and is divided into three columns. The following is an example taken from Grade II which shows one section of the curriculum area devoted to "power." The references shown apply to the books listed in the textbook bibliography together with relevant page numbers:

Course Outline	References	Suggested Activities
III POWER		
A. Wind	9:138-143 1: 52-53 8:169-171	Build devices to use various forms of wind. Construct kites, decorate and fly them.

(Bertie County Board of Education, 1971, p. 46)

Safety suggestions, description of the uses of tools and equipment and an extensive reference to resource materials (films, pamphlets, filmstrips, slides and transparencies) are included in the curriculum guide.

The approach that modern textbooks are filled with references to technology which are only touched upon by elementary school teachers and which form a most important segment

of life and living follows very closely the study made by W. R. Hoots, Jr. who developed a course of study for industrial arts education at the elementary school level in a study made at East Carolina University in 1968. Hoots (1968) outlines this course of study in an American Council for Elementary School Industrial Arts 1969 publication, "An Industrial Arts Curriculum For the Elementary Grades."

The instructional materials are used by the pupils in group or individual activities. Pupils select activities from a series of options relating to the areas being studied and then plan the activity with the teacher, prior to conducting it.

The program is implemented in the normal classroom situation. Physical settings within each school differ or vary according to space available and needs of the school. All pupils have access to identical equipment and materials. Only the physical room setting varies among classes or schools.

The equipment provided consists of a commercially produced mobile tool cart equipped with an assortment of hand tools specially designed for elementary schools. Each of the schools is supplied with at least one of these units. The tool cart is supplemented by a portable workbench which provides an extra work surface and storage for additional tools and equipment. In order to expose students to a more realistic industrial technology, a number of small power tools were incorporated. A ¼" drill, sabre saw, finishing sander and a jig saw were found to be appropriate for the elementary

classroom.

Activities undertaken are many and varied. They all stem from the textbooks for the grade, are closely allied to other areas of the curriculum and are used as a vehicle of the learning experience. The following extracts from an article by Heckman and Barrington (1970) both curriculum co-ordinators for the program, illustrate the variety of activities undertaken:

> A second grade class has been studying the uses of electricity. They found pictures of items using electricity. To follow up their study, our low voltage DC power supply was put into operation. The students experimented with it by hooking up several toys, and then they experimented with lights. As a continuing activity, these students have constructed a small house and are planning to wire it with lights and a door bell as their wiring project.
>
> \- - -
>
> In the 6th and 7th grade classes at one school, students had been studying paper and paper making. The students explored the idea of making their own paper. A field trip to a paper mill stimulated their interest by providing for them a realistic experience. They were given samples of the pulp, liquors, chips and different grades of paper. The students used the pulp to make their own paper. They developed their own techniques of making paper and were quite successful. This unit was an outgrowth of manufacturing correlated with their social studies.
>
> \- - -
>
> Students in a fourth grade class, in studying safety, decided to make their own traffic signs. They did some research into the shapes, colors and materials used in highway signs. Then they constructed their own signs and did their own art work.
>
> \- - -
>
> After a field trip to a North Carolina dairy, fourth grade students decided to compare homemade dairy products with the manufactured dairy products. They made ice cream, butter

and cottage cheese. . . . They realized the work involved in making these products and how industrial technology has allowed these products to be made in such great quantities.

- - -

Students in another fifth grade class, in studying about communications, used screen process printing to learn about one phase of the printing industry. They put their own ideas on the paper, cut out the design and printed it. Through their individual research, they learned the history of screen process printing and its relation to modern-day printing production.

- - -

Students in a sixth and seventh-grade class, in studying about clothing, decided to delve into the textile industry. They first made a crude loom and did some very simple weaving. They refined their process and, by injecting their own techniques, obtained a better and faster weave. As a final step, they wove some placemats. They went on to dyeing process, and a field trip to a dye plant revealed many important facts about textiles to them.

- - -

A fifth grade class, in studying power, has been mass-producing small electric motors. They have set up jigs at each station to enable them to work faster. Along with this work, they visited a power plant (to see where and how electricity is generated) and an electric motor rebuilding plant, where a motor was completely rebuilt for them, showing every step and its relationship to their electric motor assembly.

- - -

Kindergarten students have effectively used the Dremel vibrating jig saw, and many hand tools in making jig saw puzzles, Christmas tree ornaments and other items (pp. 43-45).

Heckman and Barrington (1970) conclude by pointing out that the most rewarding aspect of the program has been the realization of the participating teachers that their pupils possess the ability to deal effectively with a "technical learning environment" (p. 45).

Elementary School Industrial Arts

Centennial School District, Warminster, Pennsylvania

<u>Background</u>

In 1962, the staff of Centennial School District, in consultation with various leaders in education, began to develop a plan for a comprehensive elementary school. The facility envisaged was to house children with a complete range of educational ability; including classes for the physically handicapped, gifted, mentally retarded, language disabled and all the neighbourhood children, grades K through 6.

The resulting plans, unusual in design, were to provide the children with a unique educational environment which would overcome some of the structural deficiencies in typical school plants and would lend itself to research in learning.

The construction, completed during 1967-1968, was designed for a program which would revolve around three learning centres -- the library, the auditorium-gymnasium and a unique special experience laboratory.

The overall plan provides for total pupil mobility from one educational classification to another. Such movement will be dependent upon the pupil's individual ability, attitudes, needs, interests and his own educational growth and development. Emphasis was placed upon sensory experiences forming the core of the curriculum. The special

experience laboratory was designed to provide this function. In the Progress Report No. 1 on the planning and construction of the complex (called Everett A. McDonald Jr. Comprehensive Elementary School) published in March, 1971, the purpose of the special experience laboratory is described thus:

> We will be attempting to stimulate the child's environment and will be providing him with many dynamic sensory experiences heretofore not possible. We will be able to bring vicarious experiences to children who would not have these experiences under any other circumstances. The potential in developing new curricular is unlimited (p. 5).

A number of programs were developed to utilize the exceptional potential of the special experiences laboratory. The industrial arts program was one of these. The annotation of the program, contained in the aforementioned Report, states:

> Experiences will be planned which will involve students in the use of tools, materials and industrial processes. It is our feeling that new problems must be identified which will challenge the creative potential of the student. Some of these problems will be found in the works of contemporary scientist-engineer-artists who use industrial tools and materials to create products that are outstanding in the esthetic qualities. Craftsmanship is an essential element in these projects (p. 6).

An initial E.S.E.A. Title III operational grant to the amount of $432,000 was made in 1966 for the construction and development of the special experiences laboratory. In 1967, a second E.S.E.A. Title III grant, "A Design for Curriculum Research, Development and Evaluation," to the amount

of $114,425, provided for the staffing of the special experiences laboratory and one specialist teacher in the industrial arts center. This grant also provided $8,000 for equipping the industrial arts center.

The industrial arts center was designed to fulfil two distinct but related functions. The first was to provide a facility for the development of an elementary industrial arts program. The second was to act as a supportive facility for the special experience room.

Objectives

Donald C. Hoffman, the industrial arts specialist, sees the primary focus of the industrial arts program as "providing a richness of experience (Hoffman, 1971, p. 113)." For him, the industrial arts center is a laboratory where pupils are given an opportunity to explore and experiment with the technological and aesthetic aspects of their experiences in the classroom. As well, he sees it providing an additional learning environment for the pupil to practise and integrate his knowledge toward personally unique and tangible goals. Further, he envisages that, as the industrial arts center becomes an essential vehicle for this personalized learning, it becomes increasingly obvious that the center provides for intellectual, aesthetic and functional dimensions of the environment resulting in a rich blend of experiences for the pupil (Hoffman, 1970, p. 41).

The program fulfils the following objectives in a variety of ways from K through grade six.

1. The child will experience historical processes that have contributed to the development of our technology.
2. The child will experience a variety of current industrial methods including the line production technique, use of jigs and fixtures, and the interchangeability of parts.
3. The child will develop a critical and questioning attitude towards the quality of architecture, textiles, furniture, etc., within his environment.
4. The child will value craftsmanship, strive to improve his own craftsmanship abilities and develop a sensitivity to the craftsmanship displayed by others.
5. The child will seek unique personal solutions to problems relating to industrial arts.
6. The child will develop an affection for materials and a respect for tools and machines.
7. The child will experience a variety of craft activities.
8. The child will develop a meaningful perception of form, space, light, colour, texture and other important human insight.
9. The child will develop skill in using tools.
10. The child will explore and experience works produced by contemporary scientists-engineers-artists.
11. The child will be aware of the role of the industrial artist in our technologically-oriented society.
12. The child will develop respect for material and natural resources (Hoffman, 1971, p. 114).

Operational Aspects

The industrial arts center was designed to enable children to work with the following materials: plastics-acrylics, co-polymers, polyesters, woods, metals, tri-wall

cardboard, styrofoam, cement, paper, graphics letterpress, block and silk screen printing, textiles (weaving and sewing) and ceramics.

The approach taken is not based on teaching a predetermined body of knowledge that children are expected to master. The pupils come into the industrial arts center by appointment and spontaneously (there are no scheduled classes) to work on problems that are meaningful to them and are related to activities in their regular classroom (Hoffman, 1971, p. 114).

Both pupils and teachers are given an opportunity to increase cognitive and affective learning through experimentation and creative expression. The art teacher works very closely with the industrial arts specialist to accomplish this. There is a constant interchange of new ideas, plans, and questions between the teachers and the industrial arts specialist.

Problems that are solved in the industrial arts center as a consequence usually originate in the classroom where the usual subjects are being studied. The activities that grow out of the original problem are not confined to the industrial arts center but are carried out in the classroom or in both areas simultaneously. The type of activity determines the area used.

Industrial arts experiences assume various forms and culminate in many ways. They could all be listed in one

or a combination of the following categories:

1. Project construction in large or small groups or by an individual child.
2. Line production experience.
3. Research and experimentation.
4. Exploration of processes and/or materials.
5. Free creative expression (Hoffman, 1971, p. 114).

The following are some examples of activities in the industrial arts area:

> Thirty seven first graders mass produced wind chimes in their classroom using ceramic clay. Each child was given a job on the construction line. The jobs were: rolling clay, cutting shapes, perforating, scrap removal, texturing and quality control. The green clay was fired in the Industrial Arts lab and then returned to the classroom for application of the glaze. Final firing was done in the Industrial Arts lab then pieces were tied together in the classroom. Wind chimes and mobiles have since been constructed by other children from many different materials.
>
> \- - -
>
> Two fifth grade boys shaped the blossom of a flower from unfired ceramic clay; then used the vacuum forming process to make a display on which the parts of the blossom were painted and labeled.
>
> \- - -
>
> Four fifth grade boys constructed an "Optical Illusion Box" using one-way mirrors, back lighting and rear view projection. The purpose of this box is to study the characteristics of light and how perception of light effects can be altered by such things as reflections and refraction.
>
> \- - -
>
> A small group of boys come in after school to build model cars which they have designed and for which they are constructing all parts including the stylized fiberglass and polyester bodies. Children may use facilities before and after school by appointment.
>
> \- - -
>
> Two fifth grade girls have constructed a simple working model of a hydro-electric plant for science class demonstrations.
>
> \- - -

> Fourth grade boys built models of five basic types of fixed bridges (contilever, arch, truss, simple beam and suspension) as part of a demonstration for a social studies unit.
>
> \- - -
>
> A sixth grade class is publishing a book. The children have made the paper, written the copy and will print and bind the book (Progress Report No. 5, August 1970, pp. 7-8).

During the problem-solving process the child is encouraged to evaluate his or her own work. The classroom teacher ultimately evaluates the tangible outcome of the child's efforts. The classroom teacher and the industrial arts specialist confer continually regarding the pupil's progress in the areas of verbal ability, behavioral characteristics, manipulative abilities and changes in attitude (Hoffman, 1971, p. 115).

The initial success of the program has prompted the school board and administration to fund a second major facility and employ an industrial arts specialist to staff it. A third major center is planned together with mini centers at the eight other elementary schools within the school board district. The mini center is planned to consist of a room or area of any size with saw horses, portable tool panel and work surfaces with vises.

Hoffman (1971) attributes the success of the program to:

> . . . a progressive school board and administration, Federal funding and a teaching staff receptive to new ideas . . . (p. 115).

Integrated Handwork

City School District, Rochester, New York

Background

The 'handwork' program in Rochester has had a long history, the first program being implemented in 1940. Since that time, the name has changed from the original 'handwork' to Unified Arts, Experimental Handwork, Integrated Arts, and finally, to Integrated Handwork.

In 1949 the program was placed under the control of the Industrial Arts Department for the City School District of Rochester. By 1967 the program had a staff of as many as twenty-one teachers serving grades K-7 in two types of approaches, namely, integrated handwork for grades K-6 and a traditional industrial arts program for grades six and seven.

The integrated handwork program was carried on in approximately half of the elementary schools. A specialist teacher was assigned to a number of schools to conduct a program of handwork which was a direct outgrowth of the classroom units of instruction. At times the handwork teacher worked in the classroom. At other times the class or portion of the class, moved into the Integrated Handwork room for constructional activities. In 1967 this type of program involved twenty-nine of Rochester's elementary schools and served 20,000 children.

The other elementary schools in Rochester had a more traditional industrial arts-homemaking arrangement. This program was concerned with introducing the boys to basic tools and developing desirable work habits. All sixth and seventh grade boys were assigned to the 'shop' for one period per week where they were given a variety of tool experiences in areas of wood, metal, electricity, ceramics and crafts.

The early program was described as a 'method of teaching.' By 1957 critical rethinking was made as to the role it should play in the elementary school and how it could justify itself. At this time the trend towards correlated or integrated activities began to be recognized as desirable.

Severe budget restrictions in 1968 saw the combination of the Integrated Handwork Program, the Elementary Home Economics Program and the Art Program into a Three Arts Unit. Unfortunately the three staffs were unable to resolve their difficulties and the "Three Arts" program was disbanded. At the present time, the previous integrated handwork program is being implemented on a reduced basis. It is serving primarily intermediate schools 4-6.

The program is not nearly as strong today as it was five years ago. In the 1960's displays, pamphlets, program guides, sets of colour slides and films were produced to orient teachers, administrators and other interested people to the program. Further, by providing classroom teachers

with the type of help they themselves needed at the time they needed it, the Handwork Program gained a tremendous amount of popularity amongst classroom teachers and principals. These people continue to be firm supporters of the program and are mainly responsible for its re-implementation after the abolition of the Three Arts program.

Objectives

The most recent description of Integrated Handwork was put out in 1964. It defines Handwork as an integral part of the teaching procedure of the elementary school and sees it introducing boys and girls to a variety of materials, tools and appropriate methods of using them. It provides children with a means of expressing ideas in a natural social situation which fosters the development of social habits and character traits. Specifically, DeLapp (1968) sees the purposes for having an Integrated Handwork Program in the elementary school as:

> 1. To enforce meaningful classroom concepts through the use of materials and tools.
> 2. To expose children to the tools, materials and methods which affect their lives so much in our society.
> 3. To provide a laboratory experience for all students to express, constructively, concepts as requested by the classroom teachers; a place for experimentation, exploration, experience and enrichment (p. 12).

Thieme and Pugh (1964) describe the purpose of the program thus:

> The students are acquainted with a variety of raw products, processes, tools, and materials. They build an appreciation for the skill, ingenuity, patience, and time required to produce a finished product.
>
> The students are given an objective media for expressing purposeful ideas and helped to discover and develop natural abilities. They are placed in a natural social situation through which certain character traits can be observed and developed.
>
> The classroom teacher utilizes handwork in order to add dimension to learning situations, stimulate purposeful reading and accurate observation and group research, and to add variety to classwork. Handwork provides an opportunity to apply principles of construction and design and to develop and encourage creativity (p. 144).

Operational Aspects

The program does not emphasize a fixed course of instruction. There are probably as many different methods of carrying on a program as there are integrated handwork teachers -- and then this number must be multiplied by the number of classroom teachers each works with. It consists of numerous integrating projects which result when the classroom teacher, pupils and the integrated handwork teacher work together in planning a unit of work. The major responsibility for a purposeful, integrated activity rests with the classroom teacher. DeLapp (1968) suggests the following as a basic procedure for implementing a typical activity:

1. A classroom teacher decides upon an activity and contacts the Handwork teacher to see if it is possible.

2. The classroom teacher and the Handwork teacher make basic plans and identify goals and purposes for the activity.
3. The classroom teacher fills out an Activity Request form which goes to the principal for approval.
4. A time schedule is set up jointly by the classroom teacher and the Handwork teacher for planning and working.
5. The classroom teacher and/or the Handwork teacher introduce the activity to the children.
6. While the children and the classroom teacher prepare for the activity, the Handwork teacher prepares materials and devises appropriate methods for the children to use.
7. At the appropriate time, the Handwork teacher, the classroom teacher and the children all together, or in various combinations, carry out the activity.
8. The follow-up or utilization of the experience or the constructed items is carried out by the classroom teacher or the classroom teacher and the Handwork teacher together.
9. Finally, an evaluation in terms of the original purpose of the activity is made (p. 5).

Emphasis is placed on the classroom teacher having the major, if not the most important role in the activity. When pre-planning a new unit of study, she initiates the activity by deciding whether or not to incorporate it and basically, what it will be. Sometimes it can be an original idea, but very often the integrated handwork teacher, once he is familiar with her unit or goals, will suggest an activity for her particular class or situation. Many suggestions for activities come from the pupils themselves during pupil-teacher planning sessions which may include both the classroom and integrated handwork teacher. If the activity

is to be carried out in the integrated handwork 'shop', she accompanies the pupils and works with them, listening for questions or comments which reflect correct, or incorrect meanings the children may be developing.

DeLapp (1968) describes her role thus:

> The classroom teacher uses Handwork activities to add variety and interest to her units, to motivate children to develop desirable academic skills like reading for a purpose or listening critically. She plans activities and projects which help the children visualize or really get the feeling of abstract concepts which are often only described with words or flat pictures. She uses Handwork to foster such things as problem-solving and creativity. She deliberately plans activities around concepts she wants the children to remember, because she recognizes that involvement in an activity and retention go together (p. 7).

The role of the integrated handwork teacher has, as its main function, the assistance of the classroom teacher in accomplishing those activities she cannot provide for her class by herself. He translates the classroom teacher's ideas into workable terms and participates in the activity through its completion and evaluation.

Activities can be scheduled for a number of sessions spaced throughout the year, or when the classroom teacher feels there is a need. In some schools a combination is used at different times of the year.

Emphasis is placed upon using the classroom for activities or at least parts of activities. Often, in these cases, the integrated handwork teacher merely supplies the

materials or aids with incidental demonstrations. Other activities are begun in the 'shop' and finished in the classroom.

While no set program is provided, a collection of integrated handwork activities has been assembled to perpetuate and share ideas. These activities are divided into grades and further subdivided into units of study and the integrated activity it suggests. The introduction to this booklet points out that it is designed to serve as a source of ideas only -- to "encourage new ideas and serve as a basis for close co-operation and discussion between the classroom and handwork teacher (Industrial Arts Department, City School District, Rochester, no date, p. 2)."

The following is an extract from this booklet, showing the collection of integrated handwork activities assembled for Grade 1:

AREA OF STUDY	ACTIVITY
Language Arts	
To use with Stories that children were reading in class	Hand Puppets, Puppet Stage Play Screen, Store
Teaching Aid Reading	Stuffed oil cloth dolls of Puff and Spot Color and Shades Masks - Billy Goats Gruff Notebook Covers
Communication	Telephones Moving Picture Box Television Set

[illegible]

Arithmetic

Counting and Sharing	Store 10-Bead Counters 100-Bead Counters Arithmetic Games 100-Spool Counter
Telling Time	Grandfather Clock-Floor Model
Savings	Paper Mache Banks
Counting	100 Squares and Frame Abacus
Arithmetic Game	Fish and Metal Plate
Strengthen Number Concept	Ring Toss Game

Social Studies

Reading	Panorama of Zoo and Animals
Study of Farm	Cardboard Box Farm Buildings
Study of Home and School	Model of School Indian Tom-Toms
Beginning Map Skills Home and School	Community Map Calendar-Moveable Parts Paper Mache Helpers
The Home	Doll House
Neighbourhood Study	Community Scene
Citizenship	Play-House, Store
Indians	Leather Pouch

Science

Using Garden Tools	Rake, Shovel, Hoe
Magnetism	Construct Permanent Magnets
Care of Animals and Pets	Rabbit Cage Gallon Jar Incubator Bird Feeder

Science (cont.)

Seasons	Leaf Prints
Wind	Kites Pin Wheels Sail Boats
Conservation	Container to Hold Seeds Grown in Classroom
Music	Indian Tom-Toms Eight Bottles, Water, Suspended Mallett Musical Instruments - Bells, Drums, Cymbals, Rhythm Sticks, Tambourines
Holidays	
American Traditions	Baskets for Easter Christmas Wreaths
Christmas	Ceramic Hand Plaques Note Pad Holders Tree Ornaments Hand Plaque Cement Asbestos
Easter	Cookies
Mother's Day	Painted Flower Pots Figures and Ash Trays - Ceramic
Valentine	Cookies and Candy
Health and Safety	Panorama of "Healthtown, U.S.A." Safety Signs
Good Meals	Cook Breakfast, Baked Apples, Baked Cookies Ceramic Spoon Holder
Boats	Sailboats

General

These Projects are all for the home. Shapes or designs depend upon class study or interest when made.

Cheese Board-bell shaped, also Cutting Boards shaped like animals.

Toothbrush Holder-snowman
Write on Board
Key Rack-leaf of wood
Flower House Number
Bird House Number
Bird Stick
Garden Stick
Paper Mache Tray
Tie Rack
Belt Rack
Flower Pot Holder

Industrial Arts Enrichment in the Elementary School

Kansas City Public Schools, Kansas City, Missouri

Background

In Kansas City Public Schools, a number of industrial arts consultants direct activities. For some time, these activities were confined to fifth and sixth grades. During the past few years a pilot program for kindergarten through sixth grade has been organized as part of the school curriculum and has been most successful.

The consultants supply tools, materials and equipment needed for each lesson, instruct boys and girls in correct practices, and encourage good work habits and workmanship. Each consultant is responsible for thirty-five to forty five classrooms in from seven to ten schools, depending on

the number of fifth and sixth grade classes in each school.

All the teaching of manipulative activities is done by the industrial arts consultant. The classroom teacher attends the industrial arts classes and correlates activities with what is being done in the classroom. All materials and tools are supplied by the industrial arts consultant using an instructional materials budget. Scheduling of activities is kept flexible so that the activities can meet the needs of the individual school and class. The consultant meets with the classroom teacher to plan activities that will be meaningful to a particular unit of study. Activities are selected and planned so that they can be completed at the end of the instructional unit. The number of units of study undertaken with any one class will vary according to the number of times the classroom teacher sees the need for supportive industrial arts enrichment activities, the facilities, and availability of consultative assistance.

Activities take place in a variety of facilities. A number of older elementary schools have well equipped laboratories remaining from a time when seventh grade was included in the elementary school. Some of the newer schools have been built with a multi-purpose room furnished with industrial arts and home-making tools and equipment. In schools that have no extra space, portable work benches, with built-in tool panels and storage cabinets are used in gymnasiums, auditoriums, and corridors.

[illegible]

Objectives

Mastery of tools and materials is not the primary goal. Wonacott, Giovannoni, Hedrick and Boyd (1964) describe the purpose of the program in the following manner:

> Elementary industrial arts in Kansas City provides activities which help children relate in a practical and concrete way to the information they learn in nearly all their subjects. Reading, writing, spelling, listening, discussing, measuring, and computing are all involved in the activities of the industrial arts program. The activities serve as a means of enriching the total curriculum (pp. 51-52).

This close correlation with the basic curriculum units of the elementary schools results in an integrated program of instruction. Kansas City, Missouri, Public Schools (January 1968) lists the following purposes for the program:

> The purposes are to give significance and value to other subjects through creative activity; to furnish opportunities to acquire leisure time interests; to help the pupil understand what is going on around him in the industrial world; to develop an appreciation of various people in terms of their culture; and to help him become an intelligent consumer of industrial goods (pp. 5-6).

The same publication states that a well planned and conducted industrial arts enrichment program can accomplish the following:

1. Provide an opportunity for children to work with tools and materials of industry.
2. Develop good work habits and attitudes.
3. Provide an opportunity for children to plan, experiment, investigate, and solve problems through objective media.
4. Provide enriching activities and experiences which clarify thinking, supply

meanings which build desired concepts, and extend knowledge.
5. Motivate further study and create new interests.
6. Provide an opportunity for children to work together cooperatively (p. 6).

Operational Aspects

The Elementary Industrial Arts Curriculum Guide for the program indicates that the content "grows out of the needs of all people, and can be considered under seven headings: (1) food, (2) clothing, (3) shelter and home furnishings, (4) utensils, (5) tools and machines, (6) records, or books and publications, and (7) industrial development and its effect on our civilization (Kansas City, Missouri, Public Schools (1968), p. 5)."

Activities carried out can involve the class being organized into committees with each committee being responsible for a project, or each pupil can construct an individual project which he takes home. The former case could involve a unit on simple machines, each committee being responsible for one example. The products are often used for demonstrations and experiments in the classroom. In the latter case, each pupil constructs an individual project that ties in with a unit of work in the other classroom curriculum areas. Some examples are picture frames, tie racks, book ends, and "other small projects children like to make (Kansas City, Missouri, Public Schools, 1968)."

The Elementary Industrial Arts Curriculum Guide for grades five and six has been organized to offer suggestions as to how industrial arts teachers and classroom teachers can find creative ways to enrich the regular classroom curriculum. It points out that these opportunities appear frequently in mathematics, science and social studies and offers many suggestions for activities from these and other selected curriculum areas.

The following is an example of how the material is presented in the curriculum guide. The example is taken from the section which applies to Science and Industrial Arts:

> Industrial arts activities offer many opportunities to enrich and add meaning to the field of science. In the industrial arts enrichment program for the fifth and sixth grades, we are concerned with furthering the understandings of scientific principles through the construction of simple projects.
>
> These activities are designed to:
>
> - Illustrate the value of planning and sketching the project
> - Require accurate measuring
> - Build through actual experiences the values of working together
> - Inspire the student to complete a project
> - Construct projects which will help clarify scientific principles.
>
> Through these activities, a better understanding of science should be acquired by the student.

SCIENCE UNITS FOR GRADES FIVE AND SIX

The following units are taken from Curriculum Bulletin No. 82, *Science Experiences in the Elementary School*.

Grade Five	Grade Six
I. Birds	I. Living Things of Long Ago
II. Plant Propagation	II. Trees and Shrubs
III. Solar System	III. Sound
IV. Machines	IV. Electricity
Supplementary Units:	Supplementary Units:
V. Insects	V. Weather
VI. Rocks and Minerals	VI. Light (p. 9).

Each one of the units is further subdivided into:

1. Special Objectives for Unit
2. Suggested Projects
3. Special Materials Needed
4. Development
5. Special Teaching Aids

The following is an example of how some of these subdivisions are developed:

MACHINES (Unit IV in the Fifth-Grade Science Curriculum)

1. Special Objectives for Unit

- Develop a better understanding of the basic principles of simple machines
- Construct working models of the six basic simple machines
- Identify simple machine parts found in machines and toys
- Demonstrate the safety factor in use of tools and machines
- Show that to reduce friction more work can be accomplished with less energy

2. Suggested Projects

Basic Projects	Additional Projects
a. Pulleys - one wheel - two wheel - three wheel	a. Display board to show different classes of the lever
b. Pulley stand	b. belt trick - third class lever
c. Weight box	
d. Inclined plane board	
e. Wedge	
f. Screw	
g. Wheel and axle (wagon)	
h. Lever	
i. Fulcrum	

3. Special Materials Needed

a. Rope
b. Screw eyes
c. Cement and sand
d. Set of scales - 25 lbs.
e. Clothes hanger wire
f. Rubber inner tube (p. 10).

The development subdivision includes additional areas relating to Vocabulary, Basic Tools to be Used in Construction of Projects, Freehand Sketching, Planning Procedures, Establishing Correct Work Habits, and Demonstrating the Finished Projects.

Wonacott and others (1964) describe the application of this unit in the classroom:

> The children decided they would like to build the simple machines to demonstrate basic laws of mechanics. Their teacher requested help from the industrial-arts consultant. He divided the class into five groups, one to build each type of machine to be constructed.
>
> The children quickly saw that the project called for research, which meant a trip to the library. After much reading, discussion and planning they were ready for the construction. Meanwhile, the consultant helped the children make drawings and lists of materials

> for levers, pulleys, screws, and inclined planes. The actual construction required six sessions of one hour each.
>
> When the machines were completed, the children took them back to their classrooms, where they conducted experiments and made reports. Anyone listening to the reports would have been impressed by the children's motivation and by their understanding of the basic principles discussed (p. 52).

The program plans to emphasize career education and is preparing a new edition of the curriculum guide which will give detailed procedures for incorporating this concept in the industrial arts enrichment program.

Elementary Industrial Arts

Los Angeles Unified School District, Los Angeles, California

Background

The program of elementary school industrial arts is not new to Los Angeles City Schools. Introduced in the early 1890's, the program has been known by many names and the emphasis on its contribution has changed according to the educational thinking of the times. The industrial arts program begins in the kindergarten and continues through to grade 6, forming an integral part of the overall elementary school program. For the past forty years, the program has been taught as a means of enriching other studies and activities, and not as an isolated subject. The last decade has

seen a growing emphasis being placed upon the interpretation of an industrial-technological society through experiences involving the world of work, technology and occupational orientation.

The Los Angeles City Schools Industrial Arts Instructional Guide (1963 Revision) lists the following as distinct contributions that industrial arts makes to the elementary school program:

> 1. The clarification and application of concepts in other subject fields, such as social studies and science.
> 2. The interpretation of our industrial-technological society.
> 3. The satisfaction of personal interests (p. iii).

At present the Los Angeles City Unified School District has 436 elementary schools of grades K-6. There are no specialist industrial arts teachers and, of the 13,000 elementary teachers, probably about five to ten per cent participate in some industrial arts project during the year, usually confining the activities to short blocks of time.

Objectives

The purposes of instruction in elementary school industrial arts in Los Angeles Unified School District include:

> Developing a reasonable degree of skill and accuracy in the use of tools, processes, and materials.
>
> Providing experience mediums which encourage

> individual psychological and social adjustment.
>
> Developing worth-while attitudes, such as cooperation, self respect, a sense of belonging, and a joy of accomplishment.
>
> Providing an opportunity to observe and evaluate interests and abilities of the child.
>
> Providing experiences which explain nature's importance in everyday life (Los Angeles City Schools Industrial Arts Instruction Guide, 1963, p. 5).

Wonacott, Giovannoni, Hedrick and Boyd (1964) list similar purposes but include, as well, the need to educate boys and girls to live in a technological world:

> Elementary industrial arts is concerned with educating boys and girls to live in a technological world, to understand and to be able to use many of the technical devices around them. Through the activities, the children also acquire certain work attitudes, such as cooperation and appreciation for a job well done.
>
> Opportunities for industrial-arts activities present themselves in the social studies, physical sciences, play experiences, and children's seasonal interests. These activities can be used to develop a basic understanding and appreciation of our industrial society and to give children many opportunities for creative thinking, self-expression, problem solving, skill development, and planning (p. 51).

Wonacott makes later reference to the understanding of the world of work, and occupational orientation (see Appendix F).

Operational Aspects

A course of instruction is provided, which is designed to act as a practical reference for teachers in planning their day-to-day program. The content is a listing of basic instructional units. The material is offered as being flexible and suggestive and not restrictive.

The course of instruction lists in progressive sequence the desirable pupil Skills and Activities, Related Knowledge, and General Knowledge by grade levels. Instructional aids are included to assist teachers in implementing the classroom program.

Contained with the course of instruction are lists of safety instructions, basic tool operations, and suggested projects for social studies, science, and personal interest.

The industrial arts program is taught in the classroom by the regular classroom teacher. Each elementary school in the system is equipped with one or more tool carts with enough tools for about thirty-five children. The tool kits contain a variety of tools, most of which are used for working in wood. Each school has ten or twelve sawhorses that are taken into the classroom with each tool cart. Lately, leatherworkis being introduced into various schools through a program of inservice training.

In the kindergarten the children are organized into small groups and given the opportunity to experiment with a few hand tools, soft lumber and nails.

In grades 1 and 2, pupils construct miniature boats,

aeroplanes, trucks, buildings and other objects related to metropolitan Los Angeles, thus forming an integral part of the social studies program.

In grades 3 and 6, various projects are carried on in conjunction with the study of history and geography. In addition, pupils are given insight into modern industry by designing products, organizing and operating their own factory, and mass producing products.

An elementary school industrial arts workshop provides for the preparation of demonstration and instructional materials and offers informal in-service training. Further, classroom demonstrations, school workshops for teachers and direction in experiments with new ideas are made available as school services through the office of the elementary school industrial arts supervisor.

Practical Arts Activities

Nova Elementary Schools, Fort Lauderdale, Florida

Background

In 1963, the South Florida Education Centre, an educational park concept designed to offer continuous education from kindergarten through graduate school, developed a "Nova School" plan whose aim was to develop "a mature adult who willingly accepts his civic and social responsib-

ilities in a democratic society, possesses a sound foundation for the attainment of occupational competence, thinks critically and creatively, communicates effectively, and regards education as a life long process (School Board of Broward County, Florida, January, 1971)."

The same paper lists the following objectives for the Nova plan:

1. To develop and demonstrate quality educational programs for the Broward County schools by investigating and evaluating existing innovative programs and materials, by creating new programs and materials when necessary, by implementing and evaluating pilot programs, and by disseminating the results of such program development.

2. To provide an atmosphere and experiences for the process goals.

3. To provide a challenging curriculum and environment which will develop the academic interests and talents of every student and prepare him to assume major responsibility for his own learning.

4. To provide a curriculum which will allow each student to progress at a rate and to a depth consistent with his abilities and interests.

5. To structure Learning Activity Packages so that students may assume some responsibility for their own learning with maximum individual responsibility.

6. To develop the student's understanding of the rights and responsibilities of a democracy by according him the privilege of sharing with the faculty in the planning and implementing of the school program and policy.

7. To correlate the subject areas in a meaningful pattern that involve the student in a relevant learning situation.

8. To make available and to encourage their use of a wide range of learning resources.
9. To utilize fully the talents and time of instructors by providing aides and clerical assistants.
10. To make the best possible use of each staff member's unique talents and interests.
11. To improve the instructional program by utilizing teachers in those areas in which they are best qualified, and by teaming teachers whenever this proves feasible and beneficial to the course of study.
12. To recognize the role of the staff members in a research and developmental school for course planning, further study, and interdepartmental and professional meetings, and provide sufficient time.
13. To provide ample resources and opportunities for individual teacher growth and professional development (p. 3).

The first elementary school, Nova Blanche Forman School, opened in the fall of 1965. La Belle (1970) describes the physical layout of the school:

> Our facility was designed with a center service core consisting of an administrative suite, media center, teacher planning area, science lab and multi-purpose room with an adjoining kitchen. On each side of the center core were two suites, each containing large areas housing a program of multilevel groups being served by teams of teachers and para-professionals (p. 1).

One of the "learning stations" within the suites was converted into a practical arts room in which students made concrete application of concepts involved in mathematics, science, history and geography.

The school was enlarged in 1966, a new building

being constructed adjacent to the first lower school on the Nova Complex. This building featured the same facilities as the original building, but was more open, having a minimum of walls and partitions, allowing the central media center and practical arts area to become a part of all learning areas thus reinforcing the objectives which provided for pupils to experience real life conditions within the school environment. In helping to attain this objective, the practical arts laboratory provided space and equipment for children from kindergarten to grade six "to gain experience using tools, industrial processes, and materials, to construct projects which reinforce or enhance their learning in the academic areas (Smith (1970) p. 2)."

Nova Schools emphasizes provision for individualized education throughout a K-12 continuum of experiences. Learning Activity Packages or LAP have been developed for individualized learning and are used throughout the Nova Schools in each of the disciplines. They lend themselves ideally to including practical arts activities into classroom learnings and to relate classroom experiences to the real world.

Arena, Perry, Rubin and Hannan (no date) describe the Learning Activity Package thus:

> A LAP or learning activity package is a method of individualizing instruction. It doesn't <u>teach</u> you but rather <u>tells</u> you where to find information. This means that, instead of working with the rest of your class as a group, most of the time you will be working on your own as an individual.

> You will cover the same material that you would have covered as a group but there are greater benefits to you as an individual . . . (p. 1).

They suggest the following format for a typical learning activity package:-

1. Rationale - a statement of purpose which explains what has been studied in the past and how it relates to the material being presented.

2. Performance Objectives - the main topic is broken down into smaller areas which, when taken individually, permit the study of the topic in an orderly manner.

3. Basic Texts and Laboratory Guides - this is a listing of texts available in the classroom.

4. Pre-test - to help the pupil determine to which goals he should devote the greatest amount of time.

5. Program of Instruction - the goals are listed one by one. Texts, laboratory experiments and audio-visual materials are listed after each goal.

6. Self-Evaluation (Test) - enables the student to find out which of the goals, if any, require additional study.

7. Additional References - a listing of additional references (books and articles) which will help the student to understand more fully the material needed to reach a particular goal and at the same time possibly provide interesting material about the topic chosen.

8. Additional Activities - a listing of activities which the pupil may wish to pursue individually or with some

of his classmates.

9. Vocabulary - a check list of words or terms which should be familiar to the pupil upon completing the Learning Activity Package (Arena and others (no date), pp. 2-5).

Objectives

The practical arts program within Nova Elementary Schools is designed to serve the pupil and the teacher in making the educational experience real and meaningful. It serves two main objectives:

1. It will provide a place and/or source for activities directly related to the objectives and subject matter of the suite or classroom. The purpose of these activities is to make the specific learning experiences more realistic for the learner.
2. It will provide a place and/or source for class activities which are part of the total learning experience of a child, but which are not necessarily part of the existing scope and sequence of the disciplines being formally taught (School Board of Broward County, no date).

In light of these objectives, a number of behavioral objectives are set down. Each of the behavioral objectives involves the Practical Arts Consultant and the Suite Team in planning, preparing materials and carrying out activities together. The behavioral objectives listed are:

1. Given the Scopes and Sequences for Math, Science, Social Studies and Communications Arts, the Practical Arts Consultant and the Suite Team will plan and carry out together activities which will help

the students meet the objectives of a given scope and sequence.

2. Given a specific activity the Practical Art Consultant and the Suite Team will determine the location for carrying out the activity (practical arts room, classroom, or other area of the school), the number of students to be involved at one time (one or more), who and/or how the activity will be introduced, what materials will be prepared by the Practical Arts Consultant and by the Suite Team and what time or times the activities will be conducted.

3. Given an activity which is not directly related to a Scope and Sequence but is determined part of the total education for the students of a suite by the Suite Team and the Practical Arts Consultant, the team and consultant will determine together the learning objectives for the student, the number to be involved at any one time, the location of the activity, and the responsibilities for introducing and carrying out the activities and preparing the materials.

4. Given activities which involve materials, machines, and tools not normally employed in the classroom, the practical arts consultant will accept and carry out the responsibility for introduction of these tools, machines and material in terms of correct and safe procedures. These correct and safe procedural introductions shall be accomplished through teacher in-service training or direct introduction to the students by the practical arts consultant, whichever is determined most practical by the Suite Team and the Practical Arts Consultant (School Board of Broward County, no date, pp. 2-3).

Operational Aspects

The instructor meets regularly with the grade level teams to plan the interrelated industrial arts, social studies, science, mathematics, etc. activities. In one school

attempts are made to interrelate the practical arts program with all subject fields as well as working with blocks of students in pure industrial arts concepts. In the other elementary school, the practical arts teacher, who spends half her time teaching art and the other half practical arts, works with students only when they have work to do associated with social studies, science, mathematics, etc.

The academic activities are not planned to include practical arts in such a way that it becomes a servant to the academic area, but rather they are prepared so as to add relevance to both practical arts and the academic activity.

As well as developing activities around current academic classroom areas of study, practical arts activities are selected from academic discipline Learning Activity Packages (LAPS), previously outlined, which have been developed with built-in practical arts problems.

Activities include production or assembly line experiences where such things as boats, trucks, etc. are built. These experiences are conducted from kindergarten through fifth grade. They are usually related to a unit in social studies (e.g. transportation) or one of the other disciplines. Beginning from kindergarten, the students are involved with experiences in which they learn such things as basic tool skills, manipulation of materials, finishing. Presently, the program is tying in its objectives and activities with a continuum developed at the county level wherein

the entire program comes under major headings of communication, energy, manufacturing, transportation and marketing.

Mr. Robert G. Schaefer, the current Supervisor for Technical Science for Nova Schools, in recent correspondence with the writer, describes a typical breakdown of an area in the following way:

<u>Manufacturing</u> - Tools

Identification (name)
Uses (describe)
Skill use (development)

Manipulation Processes

Fastening - wood, metal, plastic, cloth, clay, paper
Parting - kinds (mechanical, thermo, chemical)
Forming - extruding, bending, moulding, pressing, blowing, forging, rolling, drawing
Finishing - smoothing, brushing, spraying, etc.

Materials

Identification
Uses
Characteristics (see Appendix F)

Smith (1970) emphasizes that much of the learning in Practical Arts is done through enquiry, through discovery and through creativeness, with objectives stated behaviorally and in three domains - cognitive, affective and psychomotor. He explains how this approach prepares pupils for the exploratory, individual learning programs emphasized in the middle, junior and high school programs of the Nova schools when he states:

> When students leave the elementary school and go on to middle or junior high school, they are quite prepared for the exploratory program offered for all boys and girls at these year levels. When this program first started it was difficult to explain to girls why they should take graphic arts, or electricity, or drafting, and to explain to boys why they need to know about fabrics, and so forth. The program is concept oriented. We are dedicated to having the students learn the "whys" and the "hows" of things; rather than just the "whats" (p. 3).

Smith also cites the following activity as an example of the relationship between the social studies program and practical arts in first grade:

> . . . one popular activity with teachers and children is to study the processes and the people necessary to build a house. These first grade children learn the names and the function of each person necessary in the construction of their home. They learn to spell the names correctly, they draw pictures to represent the workers, and they actually role-play, as much as possible within the school, by constructing block houses in the practical arts room, using Florida system of building. Each group of six or eight children puts together a house on a blueprint, decorates it, roofs it, furnishes it, and at the same time studies about all the workers necessary to build such a house. All other activities in practical arts also relate to activities in the continuums of the academic disciplines. The form of activity which allows students to role-play, to construct, to organize teams, and to accomplish a purpose, offers a myriad of opportunities for leadership training (p. 3).

Some of the activities are carried out in the team suites (a large learning area which can be subdivided with sliding partitions). Other activities are scheduled for the Practical Arts Laboratory.

[illegible]

Plans are presently being implemented within the Nova Elementary Schools whereby blocks of students with special Practical Arts interests will be permitted to pursue these interests aside from activities that are team related.

Project LOOM

Florida State University, Tallahassee, Florida

Background

The 1970 Florida Legislative session produced many changes relating to the role of vocational education in the State of Florida. One of the main changes was that the Legislature re-defined and broadened the responsibilities of vocational education. One of the important responsibilities was the inclusion of occupational awareness programs for the elementary schools, which required the establishment in public elementary schools by September, 1971, of exemplary vocationally-related (or world of work) education programs. The resulting K-6 program was to be part of a comprehensive K-14 vocational continuum.

Shortly after the legislation was passed the Division of Vocational, Technical and Adult Education awarded a grant to the Industrial Arts Department of Florida State University for the purpose of convening a group of educators and lay persons to ascertain the existing status of

vocational education in Florida's elementary schools, to determine perceptions related to such education, and to chart directions for the establishment of a state-wide career-development education project.

Findings from the resulting advisory workshop held in August, 1970, were used in writing a project to begin curriculum development. The State program, funded through a $73,000 federal grant, was called Project LOOM (Learner-Oriented Occupational Materials). The purposes of the program were:

1. Development of learner-oriented occupational materials that meet the needs of today's youth in a rapidly changing technological age.
2. Identification of a relevant rationale and content structure to guide the development of instructional models, including program facilities and teacher competencies.
3. Development of a sequential foundation structure for a K-6 program as part of the comprehensive vocational curriculum K-14.
4. Development of teaching techniques and methods to provide a relevant awareness to the world of work for elementary students.
5. Design potential pilot programs which may be implemented with a minimum of cost and training (State of Florida, Department of Education, Division of Vocational, Technical and Adult Education, 1970, Appendix G).

The development of materials and methodology is underway in thirteen experimental centers. In each of these centers, a group of people -- teachers, counsellors, supervisors, administrators and even some parents -- who have

seen the need for an elementary education program of the nature of Project LOOM have volunteered to work with the project. During the 1970-71 school year approximately ninety elementary teachers participated in project work sessions and developed and tested at least one LOOM unit. The format for these units is described under 'operational aspects'.

Between June and August, 1971, a series of one week workshops was conducted at each of the thirteen LOOM centers. The workshop evaluated units developed during 1970-71 and developed plans for integrating occupational education into the existing curriculum. Participants learned tool skills and other competencies needed to employ the new materials.

During the 1971-72 school year, approximately one hundred and thirty teachers will be involved in refining and implementing the initial group of LOOM units and in developing additional units.

Complete units, AV support materials, guides, etc. will be ready for large scale implementation in September, 1972. Future plans see the program being extended into the middle schools (grades 6 and 7) and junior high schools (grades 7 and 8).

Objectives

The State of Florida, Department of Education, Division of Vocational, Technical and Adult Education (1971) lists the following objectives for the program:

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

1. To develop pre-vocational interest exploration in the child leading to later specific career exploration.
2. To develop self evaluation skills leading to goal-setting.
3. To explore probable employment possibilities and patterns in the local community, state, and nation in the future.
4. To help each child develop an awareness of the life style he hopes to achieve and realize how his future employment will affect the attainment of this goal.
5. Provide for developing an awareness that career and job opportunities change and will continue to change more rapidly due to technological and societal changes.
6. Develop technical literacy of terms used in the exploration of careers.
7. To develop the ability to understand that occupations are interrelated in a wide variety of ways.
8. To develop an appreciation for different kinds of careers.
9. To build an awareness (knowledge) of the value of all kinds and levels of work (employment).
10. To create realistic self awareness in terms of work and personal-social needs.
11. Develop a degree of skill in the use of the tools, equipment and supplies that workers use in the performance of their jobs and have practical experiences in each.
12. Help each child recognize the relationship between school roles and work roles.
13. To become aware of vocational ways of satisfying his needs and interests.
14. To aid the child to become aware of parental work roles and new vocations.
15. To help develop an understanding of our free enterprise system of economics (p. 10).

Operational Aspects

Materials, known as LOOM units, were developed by practising elementary teachers and tried out in actual classroom situations. The project staff guides package development

and provides supportive services and funds.

The LOOM units are designed for integration into the regular elementary curriculum. All types of jobs, occupations, careers and professions are represented in the programs. Numerous LOOM units or packages have been developed for each grade level, K through 6. The units are complete self-contained packages which the classroom teacher may choose "off the shelf."

A format was used by project directors to guide teachers involved in the program as they developed LOOM units. The format was divided into three principle sections. Section I is "For the Teacher." Section II is "For the Student." Section III is the "Resource Section." The format requirements have been established as the result of a year of LOOM work with over 130 teachers. The resultant format represents the work of one LOOM group who applied themselves to the complete problem of format and content during 1971.

A realia activity kit accompanies the written portion of the unit. It includes those physical items which are representative of the occupation but which will not be part of the classroom or school center standard equipment. The content of the realia activity kit cannot be specified exactly, nor has a uniform method of packaging been established. At present 11" x 16" expandable wallets (portfolios) are being used for most kit items.

Emphasis is placed upon keeping the realia activity kit items and the activities of the unit as closely related to the occupation as possible:

> A unit on being a ship captain, for example, may involve children in the construction of toy boats. But, since the construction of boats is not normally associated with the work of a ship captain, an activity could be designed that would have the children employ their boats in a simulated harbor or waterway situation wherein they could move the boats in accordance with established "rules of the road," supervise other ship-board workers, receive and discharge "cargo," etc. (Project LOOM, Florida State University, 1971, p. 1).

The same article includes the following list of what could be included in the realia activity kit:

> - AV materials (please limit this to 2 x 2 colour slides and cassette tapes. Include tape scripts)
> - Originals for overhead transparencies
> - Black and white photographs (mounted)
> - Pictures from newspapers, magazines, etc. (mounted)
> - Flash cards
> - Charts
> - Diagrams
> - Samples (of products or of items used by workers in their work, such as soils, seeds, metal, wood, plastic and other samples; etc.)
> - Plans for student-constructed projects (e.g. a post office for the classroom)
> - Samples of student work
> - Art work by children
> - Written work by children (art and writing can give other teachers many useful ideas. Also, these items can be very revealing of students' perceptions of the occupation.)
> - Blank forms (e.g. checks, bank books, traffic tickets, etc.)
> - Models and miniatures
> - Special books and other publications
> - Games
> - Field trip ideas
> - Original stories, poems, songs
> - Etc. -- use your imagination (p. 1).

The suggested format for Section II, "For the Student," is as follows:

II. For the Student

A. Introduction

1. Unit title introduced

2. Reference framing (what do you know about ________.)

____

____

____

____

List several key points about the job or occupation which might be common knowledge to this age-grade group.

3. How does this relate to you?

4. What else should we know about ________________.)

____

____

____

____

5. How are we going to find out?

Procedure for investigation and activity, Overview of unit.

6. What new words will we learn?

List, with pronunciations.

B. Narrative About the Job or Occupation

How?	Lecture Story Film A book or reading Slides Tapes ITV Resource Person Other

C. Activities

The activities are of primary importance. They must be reflective of what is actually done in the job or occupation, and can include all or part of the following:

1. Class work (art, reading, writing, vocabulary, games, etc.)

2. Field trips

3. Research (library or other, such as on-the-job interviews, writing letters, magazines, newspapers, etc.
4. Use of photography, TV, tape recorders, etc. (Student made or in kit.)

5. Role playing and dramatization including pantomine

6. Occupational resource personnel

7. Making, constructing, manipulating, repairing, drawing, sewing, cooking, growing, etc. (Can be the product of the occupation or a project which can be used in games, role-playing, or other activity. Individual or group effort.

8. Discussions

9. Debate

10. Observations

11. Clubs and Organizations

12. Photographs

13. Bulletin Board

D. Summary or Closure

1. Review of job or occupation (reinforcement).

2. Lead students to frame positive statements (written or oral, recitation or discussion) on:

   (a) What I liked about ______________________.

   (b) What I didn't like about ________________.

   (c) What I like to be a (an) ________________.

   (d) What does this job (occupation) mean to me?

   (e) Why is this job (occupation) necessary (important)?

   (f) Other

3. Summarization of activity.

4. Conclusion of Unit.

5. Where do we go from here?

E. Evaluation

Were objectives attained? Describe how to evaluate outcomes of the unit.

F. The Quest for Extended Discovery

What can the student do now if he wants to learn more about the occupation?

The following is a list of LOOM units either completed or in the process of being compiled as of December, 1971. The LOOM units are listed by occupational cluster and grade level.

(*indicates completed Units)

Agri-Business and Natural Resources

Forest Worker	4
Florist	2
Commercial Fisherman	2*
Rancher	2*
Truck Farmer	2*
Dairy Farmer	1*
Gardener/Grounds keeper	4*
Cattleman/Cowboy	1*
Pepper Farmer	3*
Wild Life Manager	4*
Plantation/Farm Manager	5*
Vegetable Grower	1*
Landscaper/Nurseryman	2*
Forester	5
Agricultural/ Soil Scientist	5
Cat-Fish Farmer	
Fur Farmer	2
Citrus Farmer	2
Veterinarian	
Beekeeper	3
Oil Field Worker	5
Poultry Farmer	5

Business and Office

Switchboard Operator	2*
Apartment Manager	2*
Secretary	4
Bank Teller	INT
Computer Programmer	
Clerk	
Bookkeeper	6
Typist	
Accountant	4
Watch & Clock Repairman	4*
Janitor	
Locksmith	5-6
Employment Bureau Worker	
File Clerk	6
Bicycle Repairman	4*

Communications and Media

Sign Painter	1
Commercial Artist	6
Printer	3
Bookbinder	6*
Cable Splicer	
Photographer	4-5
Newspaper Printer	K
T.V. Repairman	
Telephone Repairman	Prim
Silkscreen Worker	5
Radio-T.V. Announcer	3*
Disc Jockey	5*
Librarian	4*
Cartoonist	4

Construction

Brick Mason	5*
Carpenter	K*
Carpenter	1*
Cabinet Maker	5-6
Roofer	K
Electrician	4
Carpenter	4-5
Tile Setter	6
Plumber	6
Cement Mason	9 Ind. Study

Consumer and Home-Making Related

Cooks & Chefs	3*
Baker	1*
Lunch Room Worker	6*
Tailor/Dressmaker	3*
Sewing Machine Operator	3
Interior Decorator	2
Fast Food Service Worker	7
Ice Cream Maker	K
Ice Cream Maker	1
Butcher	4
Housekeeper	3
Salad Maker	5
Interior Designer	5
Shoe Repairman	5-6
Furniture Repairman	5

Environmental Control

Meteorologist	4*
City Planner	3

Fine Arts & Humanities

Mosaic Craftsman	4-5
Jeweler	4-6
Singer	K-5
Dance Instructor	K
Theater Arts	
Scenery Designer	4
Poet	K
Architect	3
Ceramicist	2
Archaeologist	3
Make-up Artist	6

Health

Nurses Aide/Orderly	5
Dental Hygienist (Ass't)	6*
School Health Nurse	1*
Hospital Attendant	4*
Hospital Worker/Aide	5*
Dental Lab Technician	3
Health Worker	K
Rehaf.Instr. of Deaf & Blind	EMR
Microbiologist	6
Biochemist	6
Podiatrist	2
Pharmacist	5
Exterminator	6

Hospitality and Recreation

Guide	3*
Clown	K*
Life Guard	6*
Recreation Worker	4
Travel Agent	1
Race Car Driver	6

Manufacturing

Weaver	1*
Pottery Worker	5*
Leather Worker	SpEd*
Shipbuilder	6*
Moulder	K*
Toy Maker	K*
Plastics Industry Worker	4
Spray Room Maint. Man.	6
Machinist	6
Soft Drink Ind. Worker	3
Pattern Maker	3
Fiberglass Plastics Worker	4
Steel Worker	1

Marine Science

Scuba Diver	Int.
Marine Biologist	4-6
Oceanographer	6
Skin Diver	K-6

Marketing & Distribution

Fish Retailer	3
Retail Cashier	4*
Stock Clerk	K
Salesman	3
Jobber	4
Food Store Worker	
Checkout	2*
Meat-cutting	4*
Storage	3*
Produce	5*
Food Store - General	*
Food Store - Dairy	*
Cashier	3*
Fashion Model	7

Personal Services

Wigmaker	K
Beauty Operator	5
Barber	6

Public Services

Military Career	5*
Policeman	2*
Fireman	3
Public Relations	3*
Postmaster	1*
Correction Worker	3
K-Nursery Teacher	2
Teacher Aide	1-3
Clergyman	5
Criminologist	4
Elementary School Teacher	2
Physical Education Teacher	K
Undertaker	
Zoo Caretaker	K
Lawyer	7
Religious Worker	7

Transportation

Truck Driver	SpEd.
Auto Body Repairman	5
Truck Driver	K*
Ship Captain	K*
Auto Mechanic	4*
Bus Driver	1
Motorcycle Repairman	5
Train Engineer	K
Taxicab Driver	5-6
Airline Pilot	K
Air Traffic Controller	7-8
Filling Station Oper.	1
Airline Stewardess	4
Astronaut	7

Project Occupational Versatility

Highline Public Schools, Seattle, Washington

Background

Occupational Versatility is a project designed to advance creativity within industrial arts education. It is a Title III, E.S.E.A. (Elementary and Secondary Education Act) project. The program started in August, 1969 and is now in its third year of operation with pilot programs in three western Washington School Districts. The Metropolitan Area of Seattle Industrial Arts Consultants is the sponsoring organization.

The first year of operation was used to design the systems for the pilot programs and to prepare participating teachers and their shop facilities for testing the systems.

The second year was used to test the program and to modify and revise as was needed. The third year, 1971-72, now in operation, is placing major emphasis on measuring the program's educational value for students.

Project Occupational Versatility developed from the frustrations of experienced industrial arts teachers who saw conventional methods as being unsatisfactory. They saw a need to focus attention upon both the learner and the ways in which he learned. With this focus as a design base, the major objective of the program developed around helping the pupils learn in an industrial arts environment and not to teach industrial arts to pupils.

The term "occupational versatility" was selected to identify the sum of the characteristics the pupil would exhibit by the time he completed the program. Some of these characteristics were listed as being:

> . . . a student would:
> - be able to work independently in the industrial arts facility, utilizing those resources available to him;
> - develop a mode of operation that best suits his desires and abilities;
> - be responsible to himself and to the shop society in which he works;
> - become confident in his abilities, satisfied with his accomplishments, willing to be challenged, and capable of changing;
> - be able to give consideration to his future and to use available information in making decisions (Metropolitan Area of Seattle Industrial Arts Consultants, no date, p. 2).

Project Occupational Versatility is attempting to design an educational environment in industrial arts shops

whereby students will develop these attitudes and abilities. The program serves the middle school and the junior high school.

Objectives

Occupational Versatility is a methods project. It is concerned with the ways in which the student learns in the shop. The main objective for the student is for him to "find his role in the industrial arts environment and have the opportunity to develop the abilities of self sufficiency, productivity, and adaptability (Metropolitan Area of Seattle Industrial Arts Consultants, no date, p. 2)."

The same article points out that, to accomplish this objective, the student is encouraged to:

> 1. Select the area in which he wants to work. Select the project he wishes to produce, make the project and evaluate the results.
> 2. Manage his activities in the shop. (This includes being responsible for attendance and time utilization, material purchases, project planning, performance records, and facility maintenance.)
> 3. Instruct himself in planning procedures, material changing processes and tool and equipment usage.
> 4. Investigate career opportunities and make judgements about these with consideration to his own abilities and interests (p. 2).

Emphasis is placed upon these experiences occurring under the guidance of an instructor and not the direction of the instructor:

> The instructor is a resource for the student to call upon for assistance and counseling;

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

> the student is the manager of his activities. These roles are different than they were before, but are considered to be essential to facilitate the desired student growth and development (Metropolitan Area of Seattle Industrial Arts Consultants, no date, p. 2).

Operational Aspects

Student programs are personalized. Each student sets his own goals and works towards them at his own pace. The selection of subject areas, and the scope and depth of the student's performance is the responsibility of the industrial arts department of the local school district. Some of the characteristics of the program which allow pupils to work independently on their own interests are:

1. The separate unit shops for wood, metal and drawing were remodeled into a large, single room general shop and teachers were teamed together as instructors. Activity areas were expanded to include experiences in woods; plastics; power; electricity and electronics, bench, sheet, art and machine metals; forge and foundry; arc and gas welding; graphics; planning and drafting; general industries including construction, manufacturing, masonry, glass tile, etc.; crafts; and career guidance. Convenience for the student in multiple experiences was the guiding theme in the layout design.

Each area is self contained and all materials, tools and machines are colour coded for identification and easy shop maintenance. Open storage makes all tools, supplies,

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

instructional materials and project samples readily available to pupils.

2. The student is charged with the responsibility for instructing himself in any process, procedure, or tool or machine operation he needs or desires to learn. This self instructional system saw the development of a wide variety of information sources to assist him. These resources include loop films, cassette tapes, film strips, charts, and instruction sheets. The teacher is resorted to as an information source if all else fails. His responsibility is to check the efficiency of students self instruction and to see that learning is thorough and accurate. He functions as an observer, offering suggestions as needed or requested.

3. The program is non-graded and ungraded. All grade levels, boys and girls, beginners and the more experienced are mixed together in a heterogeneous class to provide a co-operative learning situation among students. Students maintain a performance record and obtain course credit, but receive no grades.

4. Pupils work both independently and team together. They set up assembly lines for mass production, or combine together on a construction activity. If they wish, they may focus upon individual projects and learning experiences which are of interest to them.

5. The pupil is encouraged to become interested in gaining information about careers or future employment

related to areas in which he has worked. A guidance area with an easy-to-use directory to books, catalogues, films and tapes provides this information.

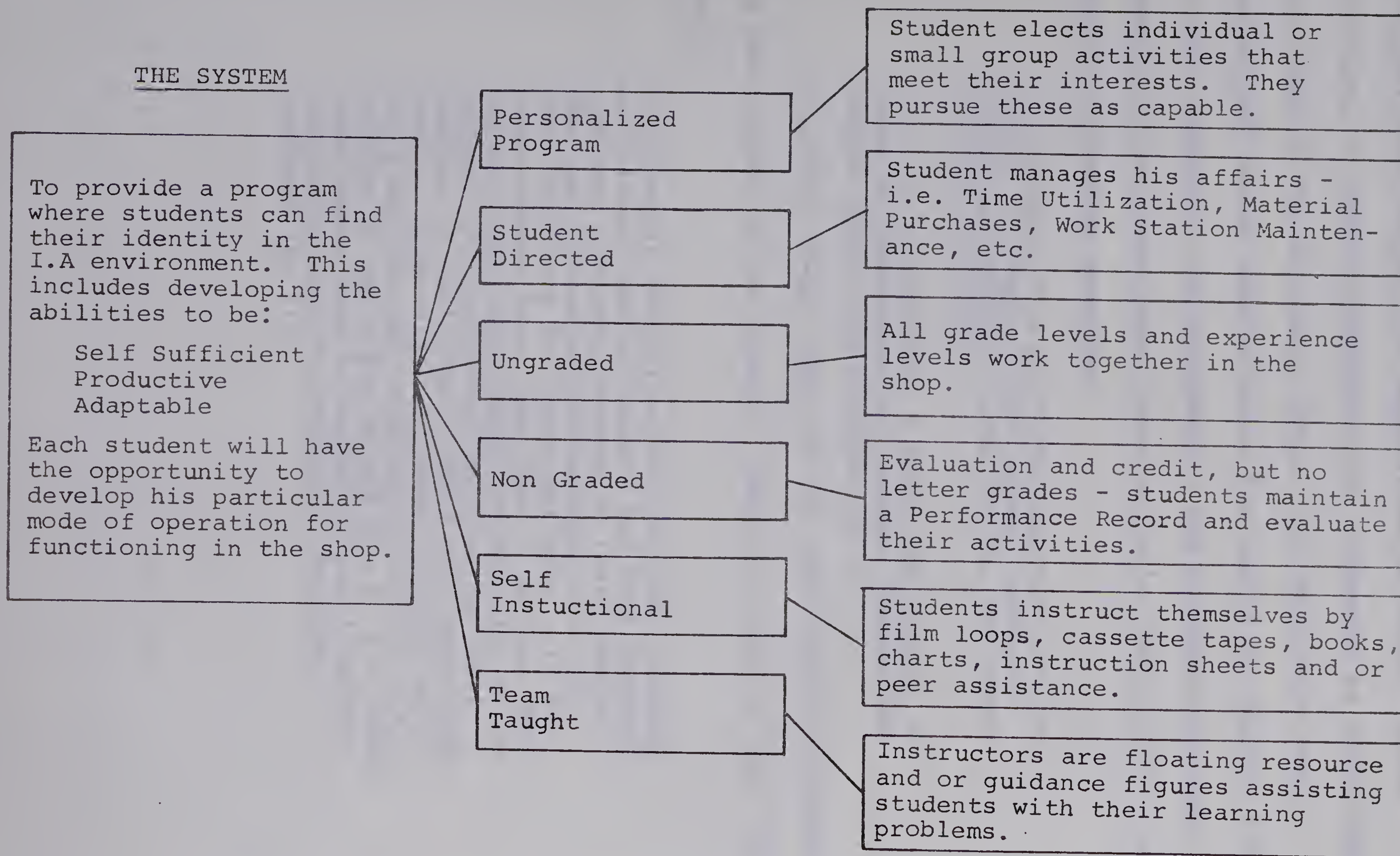
6. The pupil manages his own program. He plans and maintains his own time schedule, organizes material, purchases and maintains his own work station, etc. Each student has a notebook for his guidance and records.

The Metropolitan Area Industrial Arts Consultants' news bulletin (March, 1970) identifies the following five systems as being component parts of the program:

> Management System - The student will be responsible for managing his activities in the shop. These activities will include roll, attendance records, clean up duties, materials and supplies, purchases, and performance records.
> Facility Design - The facility will be designed as a place where individuals come to work in a self-instructing system. The relationship, design and location of the areas will enhance exploratory activities and cooperative work experiences.
> Guidance System - The student will be able to develop an understanding of the vocational opportunities related to the industrial areas represented and of the attributes necessary for selection.
> Safety System - The student will develop a safety perception and the safety habits required in a shop setting.
> Self-Instruction System - The student will be able to select an instructional device that will guide him through the appropriate steps with the necessary instructions and resources for the solution of his problem (p. 1).

A schematic layout of the instructional system is shown in Figure 1.

Figure I.


THE SYSTEM
To provide a program where students can find their identity in the I.A environment. This includes developing the abilities to be:
Self Sufficient
Productive
Adaptable
Each student will have the opportunity to develop his particular mode of operation for functioning in the shop.
Personalized Program
Student Directed
Ungraded
Non Graded
Self Instuctional
Team Taught
Student elects individual or small group activities that meet their interests. They pursue these as capable.
Student manages his affairs - i.e. Time Utilization, Material Purchases, Work Station Maintenance, etc.
All grade levels and experience levels work together in the shop.
Evaluation and credit, but no letter grades - students maintain a Performance Record and evaluate their activities.
Students instruct themselves by film loops, cassette tapes, books, charts, instruction sheets and or peer assistance.
Instructors are floating resource and or guidance figures assisting students with their learning problems.

As Occupational Versatility emphasizes individual pupil activities, no specific projects are suggested as activities. Within each of the available areas, the facilities offer numerous and varied opportunities for pupils to explore with available materials and equipment. The Metropolitan Area Industrial Arts Consultants' news bulletin (Fall, 1970) contains the following examples:

> The masonry area provides opportunities for pupils to sample brick laying, concrete mixing and paving, slate laying, and other similar activities.
>
> . . . to disassemble a small gas engine, a hands on experience in internal combustion engine theory and practice (p. 2).

The Fall (1971) issue of the same bulletin contains this description of the General Industries area at Tyee High School:

> The General Industries now include "teaming activities" where students may work together and mass produce projects of their choice. They may also elect to assembly line produce Xmas toys for needy children. In the construction area, they have 3 options that may be either approached individually or in groups. A simple dowelled together wall section is available if this will meet their needs. Those wishing a more in depth study may elect the wall section of the I.A.C.P. program or may elect to build a 6' x 8' shed. Team composition in number or participants and duties are determined by the group involved (p. 2).

Technological Exploratorium K-6

Hudson, Ohio

Background

In 1970 a grant of $73,300 under Title III E.S.E.A. (Elementary and Secondary Education Act) was awarded to the Summit County Board of Education for the first year of a three year proposal entitled, "A Technological Exploratorium, K-6." The study is being conducted in the Hudson, Ohio, Public Schools. All told, the three year program will involve a total grant of approximately $300,000. The federal funds pay all costs including tools and materials, salaries of full time personnel and consultants, overtime for teachers, and pays for two regular substitute teachers who rotate from class to class to allow the teachers to meet regularly with the program director and industrial arts specialist.

The purpose of the program is to:

> . . . enrich the elementary curriculum through investigations designed to involve both students and teachers in a variety of learning experiences; i.e. for developing understanding of technology and work in industries, in services, and in community living (A.C.E.S.I.A. Newsletter (Spring 1971), p. 1).

The program which involves a director, an industrial arts coordinator, and an industrial arts specialist and ten elementary school teachers (one teacher at each level K-6, one E. M. R. class, one primary neurologically handicapped and one intermediate neurologically handicapped

class) aims at both writing and implementing a series of units about technology. It is expected that, by the end of the three year period, each of the teachers will have written three complete units for a particular grade level.

Heasley (no date) explains the function of the units when she describes what the teachers involved in the planning of the units are doing:

> By analyzing basic academic, physical and social skills and carefully planning classroom activities to develop technical understandings, they [the teachers] are planning for greater variety in the growth process, encouraging free-thinking departing from repetitious type activities, stimulating new and creative thinking, planning and acting, and providing decision making opportunities (p. 1).

The units are being written on topics involving Introduction to Tools and Materials; Technology and Self; Technology in the Home, Technology in the Community; Services, Technology and Communications; Technology in Ohio, Electricity; Technology in the United States; Technology in the World; Roles of Man, Tools and Technology. In most cases the units may be implemented in either primary or intermediate levels. They do, however, follow the content of social studies units already in use across the country.

Summit County Board of Education bulletin, "Sonar," for December 1970 points out that the project director, Mrs. Norma Heasley, stresses that the study units developed for the project are going to be integrated into the existing curriculum structure and not merely added on top of it. They

further quote her as suggesting that "the units will be so programmed that other teachers may use the plans with a minimum of in-service (p. 2)."

Each unit will include:

1. Concepts - Conceptual statements in the areas of recreation, services, power, transportation, manufacturing, construction and communication are being produced. The statements will be the foundation for planning all activities.

2. Behavioral Objectives - Each unit includes a rationale for each behavioral objective.

3. Knowledge, Academic skills - Behavior, Attitude, Psycho-motor skills.

4. Procedures - a. Multi-sensory activities
b. Multi-tools, materials and processes. Areas involved are woods, metals, plastics, graphics, ceramics, textiles, power, electricity, rocketry.

5. Project Diagnosis - a. Step by step procedures
b. Materials
c. Tools

Diagnoses are included as well as notes to the teacher, key questions to stimulate thinking and evaluation and strategy for each activity.

6. Bibliography.

Technical books and tapes, project books, slides

and various teaching aids are being produced in conjunction with the units. These are being produced to facilitate the spread of the concept of the program both within the Summit County schools and elsewhere.

In 1970-71 one kindergarten, one sixth grade class, one E. M. R. class and the intermediate neurologically handicapped class participated in the program. All ten experimental classes, including one grade each from K-6 plus three resource classes are involved in the program during the 1971-72 school year.

The evaluation strategy for the research began in September, 1971. An experiment and control group were randomly selected from groups evaluated high to low. Reading achievement and/or readiness was the criteria used to place students in various groups before the random selection.

The California Test of Basic Skills, California Aptitude Test, part of the Torrence Creativity Test, California Test of Personality, Likert Scale of Self Perception, Student Opinion Poll and Word Association Test designed for the project were given to the experimental group and control group at each grade level as a pre-test. The kindergarten groups were also given part of the Peabody Intelligence Test and a psycho-motor co-ordination test. In May, 1972, a post test will be given and statistically evaluated. The results of the post test will be used as the pre-test consideration for the 1972-73 school year. In May, 1973, all the tests

will be given to determine the growth in both the experimental and control groups. A team of evaluation experts will compute the results.

<u>Objectives</u>

Hudson Public Schools (February 1971) describes how the program director, Mrs. Norma Heasley feels about the importance of the integration of the study of technology into the existing curriculum of the elementary school:

> She feels that it will not only enable the students to learn the importance of technology in our lives, and develop skills in the use of tools, but also will strengthen and reinforce academic skills such as math through the extensive use of measurements. Most importantly, reading will be improved because the students must read with particular care and be able to analyze what they have read in order to utilize the abstract knowledge they have gained in the concrete experiences of classroom projects (pp. 2 and 6).

The project's objectives, stressing creative and critical thinking, planning, acting and evaluating, are written in behavioral terms and suggest criteria for acceptable performance:

1. <u>Students Will Demonstrate Their Understanding of Man, Materials and Technology</u> Given any activity related to the technological unit being studied, students will be able to relate the significance of the technology studied to man and work and materials in written and oral communication, and through the development of a demonstration and/or experiential project. Criteria for acceptable performance and determining significant educational growth will be developed by co-operative teachers' and students' efforts.

2. <u>Students Will Improve Their Reading Abilities</u>
Given concrete purpose for reading and technical aids such as diagrams, pictures, and tapes, primary students will be able to use these materials in group and independent constructive activities. Reading, under these conditions, will show a statistically significant improvement, especially the skills of organizing, reasoning and making inferences.

3. <u>Students Will Increase Their Ability to Plan, Organize, Act, and Evaluate</u>
Given a basic design for utilizing knowledge, in concrete activities, students will be able to plan, organize, develop, and evaluate individual projects derived from individual and/or group interests and needs.

4. <u>Students Will Improve Their Study Skills</u>
Given the opportunity for experimentation and basic guidelines for study, students with previous experiences in multi-sensory, multimedia activities will be able to self-individualize their studies, utilizing abstract knowledge in concrete experiences; will design new avenues, when necessary, for learning; and will go beyond teacher expectations in quality and quantity of work.

5. <u>Students Will Increase Their Critical Thinking Ability</u>
Given key questions for investigations, students in the experimental classrooms will make multi considerations and multi process solutions.

6. <u>Students Will Utilize Knowledge and Increase Their Ability to Abstract and be Creative</u>
Given project booklets which include diagrams, procedures and materials, students and teachers of this program will be able to use these as a guide for similar and/or original project development and through a correlating study will recognize the present and future significance of knowledge gained from the experience.

7. Students Will Develop Appreciations
Given the opportunity to study man's roles with his materials and his technology, students will develop an understanding of and an appreciation for human efforts that affect their lives (Technological Exploratorium Project, no date).

Operational Aspects

The content provides for an interplay between industry and education, allowing for learning about technology and tools, machines, materials, and products. Designed around the major areas of communication, manufacturing, construction, transportation, power, services, and recreation, it allows all students to experience physically and mentally some of the involvement of man and technology in work and play, and develop an understanding of the breadth of vocations and an appreciation of human efforts. Activities enable the students to become involved in occupational, vocational and avocational role playing and creative expression. In so doing, they become aware of the value of work and how this affects man's life (Heasley (no date) p. 3).

Hudson Public Schools (February 1971) describes an activity involving the study of technology in the classroom:

> Mrs. Peg Roby, resource teacher at Hudson Elementary, took her students to visit the Warner-Swazey Company, makers of earthmoving equipment. Each child had an opportunity to actually operate one of the large machines for five minutes. What a thrill for a young child and what better way to help him understand one of the uses of these huge machines. The children wrote stories about their trip

> and have been studying signatures and book binding so they can make real books from their stories (p. 8).

Hudson Public Schools (November, 1971) describes a highly successful rocket launch:

> In a most remarkable exhibition for parents, grandparents, school personnel and community visitors, boys and girls of Mrs. Margaret Roby's class at Hudson Elementary School conducted a rocket launching exercise recently near Evamere.
>
> The launching culminated four weeks of study by the pupils and their teacher, and included basics as well as technical vocabulary, construction skills, care of materials, safety precautions, weather instruments and control factors for just such a venture (p. 2).

Mrs. Heasley, in recent correspondence with the investigator, lists the following progress for the program by February, 1972.

- very positive parent and student actions and reactions.

- student growth in academic and social skills have been continually evidenced.

- many other teachers are beginning to use tools and materials in their classroom.

- units of study are coming slowly but are being thoroughly developed.

- some teaching aids have been produced and are being printed and disseminated by Brodhead Garrett Company.

- Stanley Tool, Rockwell and Brodhead Garrett Companies have shown great interest and made contributions to the project.

- The community has become involved through field trip participation and resource speaking engagements.

Technology for Children

State Department of Education, Trenton, New Jersey

Background

The Technology for Children Project began with the 1966 Summer Institute of Technology for Children held at the Helen L. Beeler School in Marlton, New Jersey. This institute was initiated through the Division of Vocational Education of the New Jersey State Department of Education which founded the project. The Technology for Children (T4C) project is a continuation of the work started in this summer institute.

In 1966, the Ford Foundation awarded a $166,000 grant to the New Jersey State Department of Education's Division of Vocational Education, to provide salaries for a six man professional team and to provide clerical assistance for a three year period. This initial grant was followed, in 1968, by the award of a second three year funding in the amount of $304,000. New Jersey State Aid funds expended on the project during the initial grant period, more than exceeded the amount of the grant. It is anticipated that the combination of both state and federal funds expended for

the period of the second grant will be double that of the second Ford Foundation award.

Further, the New Jersey Manufacturers' Association Committee on Education, instituted in 1969, proposed a program of education that relates academic and mechanical skills to the achievement of career objectives. At the public hearing of the State Department of Education on the State Plan for Vocational Education, this committee recommended that the experimental Technology for Children Project, which had introduced tools, technology and the world of work experience into kindergarten through sixth grade classrooms, be fully and promptly integrated into the regular curriculum of elementary schools throughout New Jersey. Bill 1254, a direct result of these meetings, was passed in October 1970 to finance vocational education in three school districts. Each program included Technology for Children. These three districts have implemented the vocational program during 1971 and the Technology for Children Project has been greatly expanded in these areas as a consequence.

The Project initially had two distinct phases. The first was the Summer Institute of Technology for Children, called the "Institute Phase." It was designed to initiate a technology for children program within the classrooms of a given number of elementary classroom teachers. The institutes were six weeks in duration and accommodated approximately twenty five-teachers. Simonson (1970) describes her

experiences at the Summer Institute of Technology for Children:

> In the summer of 1968 I attended a six-week workshop that was sponsored by T4C. Here we watched children use tools and materials to figure out problems of math, science and language arts. In the afternoons we met to discuss the learning we thought had taken place. We also spent many hours in lab work, exploring those areas of technology of interest to us personally, such as silk screen printing, electrical wiring and woodworking (p. 76).

The second phase, called the "Classroom Phase" was a follow up of the Summer Institute. The participating teachers, during the academic year following the Institute, became the key contributors to the project by trying out theory in their own classrooms. The teachers had the "on-call" assistance of three Research Associates in Technology from the project staff.

The Project is currently involved in training teachers in a mid-year session which is designed to permit immediate implementation with children and provide an extended follow through in support of teachers.

Recent emphasis has been placed upon moving Technology for Children away from a single classroom idea into a more functional systems approach which has been designed to provide for an anticipated rapid growth of the program. This is being done by implementing a total systems commitment. Each district delineates the commitment and follows specific steps towards this end. This is being done by co-operating with a local administrator (generally the

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

principal of the elementary school) who establishes and operates three teams in his school and works to spread the total systems commitment throughout the entire school district. These teams and their functions are as follows:

1. The Administration Team which consists of those administrative representatives necessary for a total commitment. At the school district level this includes the superintendent, board of education, pupil personnel services administrators and teachers. At the individual school level, representation is as comprehensive as possible with the team working to achieve a total district commitment. This team is concerned with the overall management of Technology for Children, controlling and reporting the costs and evaluating the effectiveness of the program. Further, it is responsible for the direction of Technology for Children and develops one and five year plans of implementation.

2. The Teacher-Training Team which concerns itself with all problems relative to the teacher. This team conducts a teacher training program consisting of a three day released time orientation session to assist teachers to initiate the program in their classrooms. Following the three day, full time workshop, teachers are provided with tools and tool carts to take back to their respective schools, as was the case with Summer Institute members. After the teachers' orientation, the Teacher-Training Team provides them in-service, on-the-job training to sustain them in a

more effective implementation of the program. The team also provides half-day in-service sessions to upgrade the technical expertise of the teachers. During these sessions, representatives of the "business, industrial, world of work community relate to the T4C action (Dreves, Appendix F, p. 2)."

During the 1971-72 academic year, fifteen three hour meetings, with college credit, were conducted in conjunction with Newark State College, Trenton State College and Glassboro State College.

3. The Curriculum-Development Team which concerns itself with all curriculum matters.

By the end of 1971 the program had assisted five hundred elementary teachers to implement the industrial arts curriculum in New Jersey classrooms. As well, twenty elementary supervisory persons at the local level had been helped to co-ordinate their activities.

A newsletter containing news of accomplishments, ideas from other classrooms, and articles of general interest and concern to Project teachers, is prepared and distributed on a monthly basis.

Objectives

This description is directed towards what Project teachers are encouraged to teach. The Technology for Children Project has objectives relating to the preparation of

teachers for this task. The objectives outlined here relate only to those associated with the industrial arts program being implemented by teachers who have undertaken Technology for Children Project instruction.

Dr. Fred J. Dreves (1970) the current director of the Project sees it having both "academic and technical aspects." For him the program enables children to "see the world of work as it really is - society serving society by satisfying man's needs and wants (p. 2)." He elaborates:

> Technology for children is an elementary school curriculum, new in its relevance to society by virtue of its primary focus on modern technology and occupational implications, and old because of its sine qua non "learning by doing." It has been developed by the Division of Vocational Education in New Jersey, to provide elementary teachers with a means of introducing world-of-work concepts and modern technology into their classrooms (p. 1).

Dreves (no date) lists the objectives of Technology for Children as follows:

> (1) to assist the individual child to achieve a better self-awareness and to develop in responsibility for his own learning, (2) to assist him to develop a better understanding of technology and the world of work and, (3) to enhance his attainment of the basic traditional educational skills known as the three R's (p. 2).

Woodford (1971) describes the purposes of the program thus:

> The program is based on the recognition that technology and the ways in which men employ it - to survive, to improve their standards of living, and to go beyond yesterday's frontiers - should pervade the classroom as

> thoroughly as it pervades our lives. Yet the primary appeal of the program lies not in the skills it imparts but with its effectiveness in helping the student to comprehend the subject matter and relevance of language, mathematics, science, economics and other basic academic skills and to increase the student's familiarity with a range of technical careers (p. 20).

Operational Aspects

After the implementation of the Project, it was found that assistance was essential in the form of structured curriculum materials. These materials were prepared according to the following design criteria.

- To prepare four areas of curriculum materials to serve the four major disciplines found in the State's elementary schools.
- To develop seven levels of materials, as most New Jersey elementary schools are kindergarten through sixth grade.
- To highly structure the materials, to give novice implementors confidence.
- To design open-ended activities, thus permitting innovation to occur (Harnack, 1970, p. 4).

Part of the operation of Technology for Children involves helping each child maintain a record of his plans, actions and achievements in an Individual Pupil Log. As well as providing feedback to the learner and a more intelligent and specific report on each pupil for the teacher, it furnishes pertinent input data for the use of the Curriculum-Development Team. They study reports or abstracts on the Individual Pupil Logs and recommend certain activities for various general grade levels.

The result has been the development of a series of Learning Episodes, geared toward the four disciplines on seven grade levels. These highly structured Episodes "provided the beginning technology teacher with an idea for implementing a technological activity, lists of the materials and equipment needed to implement, local sources from which the material might be obtained, a cost estimate, and an outline with illustrations of the step by step procedures (Harnack, 1970, p. 4). An addition to each Episode is an "option sheet" which identifies possible places where the innovative teacher or children may branch off into related pursuits. Emphasis is placed upon Episodes being open-ended and flexible and teachers are encouraged to make use of them as they see them suiting their classes' particular needs.

In the Episodes or instructional activity units, pupils do not engage in skill development in isolation from their immediate interest. Rather, emphasis is placed upon them thinking, writing and handling tools, equipment, and materials in order to reach clearly understood and desirable objectives.

Technology for Children teachers are encouraged to individualize or differentiate instruction to particular situations as an option to large group instruction and children are encouraged to take a leadership role in learning:

> . . . the teacher is enabled to deal with children as individuals. The teacher consultant guides the pupil as he analyzes solutions to his problems. He may urge the

> use of programmed learning materials that are available or a self directed pattern of investigation. In any event, the learner is directed to take the leadership role in the learning: He operates the video-tape recorder, he molds the rubber stamps for sale and he designs and constructs the "store" in which the merchandise is retailed (Dreves, 1971, p. 119).

Dreves (no date) emphasizes the type of role the pupil plays in the program when he states that the most frequently used method in the program is guided discovery:

> The most frequently used method in T4C curriculum is guided discovery. Emphasizing the child by advocating guided discovery, is merely another way of speaking of individualized teacher-learning, long an objective of elementary education stated as "meeting the needs of the individual." The teacher as self sufficient director of technological activities strives to develop each child's confidence in his ability to motivate his own learning. Children engaged in these activities, as with workers in industry, think, plan, communicate and handle the "things" of technology in order to reach a clear objective (p. 2).

Dreves points out that actual technological activities selected for a class by the teacher may be as "simple as nailing bottle caps to a board to produce a trivet or as complex as the Video Tape-Recorder unit (1971, p.1)." He elaborates, by pointing out that technology, as the content for the program, can itself be both simple and complex:

> Technology, as the content of T4C, interlaces the entire picture of the world around us and is made up of technical aspects and academic aspects. Just as technology itself might be both simple and complex, so also T4C is both simple and complex. Examples of simplistic technology surround us everywhere and constantly offer to the attentive learner the

> invitation to inspect or investigate. Some examples are the lead pencil, the paper on which we write, the books and other printed materials from which we gain so much recorded knowledge, and in truth even the very clothes we wear.
>
> - - -
>
> Some of the more complex technologies used in T4C are the video-tape recorder, the computer, and the camera. As complex as these representative items of technology might be, their use is simplicity itself, and children find no difficulty in utilizing them. The intent is not to teach the children these complex technologies, but rather to help them to know and use some examples or representations of these technologies with thoughtful consideration of their purposes (pp. 1-2).

The writing and staging of television programs in which children are authors, set builders, costume makers, cameramen, directors and critics is the basis of one of the planned Episodes. The Project has four sets of closed circuit television equipment comprising a monitor, camera, tripod and tape recorder which it makes available to participating teachers on a rotating schedule.

One class built a voting booth and used it in the study of electoral processes. Construction of a grocery store check-out counter helped another class to study mathematics both in the design of the counter and in the "sales transactions" that followed.

A more ambitious project was the manufacture and sale of rubber name stamps by a fifth grade class. Woodford (1971) describes this activity:

> It began with discussion and organization of the prospective business, and the

> division of labour in accordance with individual skills. Students gained some understanding of business finance (they borrowed money to buy the rubber stamp making equipment) opened a checking account and established the price of their product on the basis of material and equipment costs. They learned the value and fundamentals of simple record-keeping with the help of an accountant. They learned the elements of salesmanship - appearance, manner, techniques and a knowledge of the merits of their product. Students performed each of the manufacturing operations (p. 22).

The variety of typical activities is best illustrated by Hunt (1967) when she describes the activities of children involved in one Summer Institute:

> They made paper, crystal radio sets, telegraph keys, printed by using ABC blocks, real type and the liquid duplicator, with which they ran off copies of their own stories with their own illustrations. They explored a cut-away model of a hydraulic braking system, the insides of a camera and clock, lifted each other with a two pulley system, jet-propelled a piece of wood with a balloon, popped corn and shaped plastics into dishes for the playhouse. They were visited by a man from the telephone company who showed them the equipment used on the job, the inside of the telephone, explained the safety precautions he must take on the job, put on the spurs and climbed the pole (pp. 226-227).

CHAPTER IV

A CONCEPTUAL FRAMEWORK FOR IDENTIFYING COMMON ELEMENTS IN SELECTED ELEMENTARY SCHOOL INDUSTRIAL ARTS PROGRAMS

The preceding chapters have illustrated current thought about approaches, movements and programs that was prevalent in the literature since approximately 1960 and described a number of programs selected as being the most significant in the United States of America at the present time. This chapter will provide the rationale for a conceptual framework, and then suggest how these factors are used in analyzing elementary school industrial arts programs.

Background For a Conceptual Framework

Cochran (1968) holds that it is necessary to look at the field of curriculum, especially the area of curriculum design, when developing a conceptual framework for a field of specialization, because it "is the pattern or structural organization used in selecting, planning, and carrying forward educational experiences in the schools (p. 110)."

Herrick (1950) in defining curriculum design suggests the relationship between various parts of the curriculum when he states:

> Curriculum design is a statement of the pattern of relationships which exist among the elements of curriculum as they are used to

> make one consistent set of decisions about the nature of the curriculum of the child (p. 37).

With this definition, Herrick then identifies several functions to be served by curriculum design in the implementation of educational programs. He visualizes it, for example, as "a definer of the elements of curriculum and their pattern of relationships (p. 37)." Moreover, he sees design as having a key function in selecting and organizing learning experiences and in clarifying the roles of teachers and learners in the total curriculum development process.

Herrick's concern that we see curriculum design on various levels is especially helpful in coping with the complexities of curriculum problems and indicates the basis for the nature of decisions, but, as Cochran (1968) states, "it does not provide or determine the criteria for selecting or carrying out specified practices (p. 111)." Curriculum design thus requires some type of basic structure to guide its implementation.

In an effort to develop a coherent and consistent system for getting at this problem, Taba (1962) suggests the development of a conceptual framework to give direction to the application of the knowledge advanced in fields related to teaching and learning:

> An enterprise as complex as curriculum development requires some kind of theoretical or conceptual framework of thinking to guide it (p. 413).

Taba further emphasizes this need to develop a meaningful and useful framework for dealing with the various aspects in a field when she points out that "the major question about curriculum planning is not whether to plan or not to plan, but how to do it wisely, scientifically, and on the basis of rationally recognized facts and considerations, instead of being guided by an ill considered mixture of assumptions, beliefs, and personal preferences (p. 444)."

Caswell (1950) points out that there is often a failure to recognize clearly the foundations upon which curriculum theory must rest. He suggests that what is needed is a basic plan to clarify and interpret these factors:

> The task of the curriculum worker is to draw from these fields a consistent body of basic principles as they apply to education, and to extend their application so that a clear guide to practice is provided (p. 111).

Faix (1964) feels that a curriculum structure is needed to develop a more scientific base for curriculum research and sees such a structure as being of central importance in "locating the logical relationships of the elements in a curriculum system (p. 196)." He sees the structure of the curriculum signifying the "actually existing spatial organization of its parts together with a description of the properties of each part (element) (p. 196)."

In light of these statements, the conceptual framework of a particular field of study would appear to relate very closely to a systematic arrangement which enables

investigation into its basic structure.

The Meaning of "Conceptual Framework"

Over recent years the terms "concept" and "framework" have found their way into educational terminology as replacements for terms no longer thought creditable or up to date. The trend has been more a shift in terminology than in meaning, however, as there has remained the same concern for the basic structure of particular areas of concentration (King and Brownwell, 1966, p. 81).

Cochran (1968) for example sees the term "concept" being used in reference to such things as "simple ideas, complex abstractions, single words, ideas behind words and cognitive propositions (p. 115)."

Schwab (1962) uses an array of terms throughout his text with meanings similar to "concept" -- guiding principle, model of investigated phenomena, imposed conception, and principle of enquiry. King and Brownwell (1966) see "concept" being used as a replacement for the obsolete and discredited term "subject matter."

Face, Flug and Swanson (1965) summarized its use in the field of industrial arts by stating:

> A concept is a psychological construct resulting from a variety of experiences (detached from the many situations giving rise to it), fixed by a word or idea, and having functional value to the individual in his thinking and behavior (p. 65).

The term "framework," in a similar manner, has been linked with many definitions, but is usually associated with the basic components or structure of a particular discipline. Neagley and Evans (1967) for example, use the terms "structure," "framework" and "formula" synonymously in their description of curriculum model building.

The two words in combination have also produced many variations. Curriculum literature only contains a few scattered remarks about the function of a conceptual framework and then often under the names of "conceptual system," "curriculum theory" and "conceptual structure."

Tyler and Herrick (1950) use the term "curriculum theory" and suggest three chief functions of such a theory:

> 1. to identify the critical issues or points in curriculum development, and the generalizations which underlie them;
> 2. to point up the relationships which exist between these critical points; and
> 3. to suggest the approaches that need to be made to resolve these critical issues (p. 1).

Beauchamp (1961) also used the term "curriculum theory" and defines it as:

> . . . a set of related statements that gives meaning to the school curriculum by pointing up the relationships among its elements, and by directing its development, its use, and its evaluation (p. 74).

Goodlad (1958) uses the term "conceptual system" to describe "a framework or scheme of concepts that identifies the major questions, the elements, the data sources, and the relevance of data of a given body of phenomena (p. 395)."

Emans (1966) draws an analogy when he likens a conceptual framework to a system of light houses at sea. "It does not tell where to go or restrict movement, but it is necessary to guide movement and warn of the danger spots (p. 328)."

A conceptual framework is, as described by Taba, (1962) "a way of organizing thinking about all matters that are important to curriculum development (p. 420)." She further states that a conceptual framework:

> . . . identifies the elements of the curriculum, states what their relationships are to each other, and indicates the principles or organization and the requirements of that organization for the administrative conditions under which it will operate (p. 421).

In summation, the following generalization by Taba (1962) seems most adequate:

> Generally speaking, a conceptual system for the curriculum or a theory of curriculum is a way of organizing thinking about all matters that are important to curriculum development: what the curriculum consists of, what its important elements are, how these are chosen and organized, what the sources of curriculum decision are, and how the information and criteria from these sources are translated into curriculum decisions (p. 420).

For the purposes of this study, "conceptual framework" has been defined in Chapter 1. Specifically, it is a plan designed to identify and group generalizations within the unique field of elementary school industrial arts, particularly with respect to objectives, content and teaching methods.

Identification of Curriculum Elements

While various curriculum programs could well be concerned with very different specifics, Taba (1962) points out that, on a general level, it is possible to distinguish the basic or common elements of all curriculum plans. She suggests that one way of identifying these elements is to "consider the major points about which decisions need to be made in the process of curriculum development (p. 422)." She identifies these decision sources as the objectives, the subject matter, selection and organization of learning experiences and evaluation when she states:

> The points of these decisions -- the aims and objectives, the content and learning experiences, and evaluation -- then become macroscopic elements of the curriculum (p. 422).

Tyler (1957, p. 363) similarly identifies the four essential curriculum components as being objectives, selection of learning experiences, organization of learning experiences and evaluation.

Goodlad (1966) lends support to Taba and Tyler when he points out that curriculum, when "stripped to the bone" takes its subject matter from the answers to the following questions:

> What shall be the overall aims of education? What is worth knowing? How shall the curriculum be organized? (p. 91).

He later expands upon these questions under the broad

headings of aims and objectives, organization, instruction and evaluation.

Herrick (1950) further points out that there are elements in every curriculum which must be recognized for the part they play in the learning experiences of children. He stresses that:

> . . . every learning situation must include a learner, a purpose, a content, and a process (p. 38).

There are other instances in the literature where authors discuss and emphasize other structural elements of the curriculum -- the role of the teacher, what to teach, the organization, how to teach, evaluation of learning, curriculum improvement, interests of students, needs of society -- but while the number and names of components varies, there are in fact many points of reference in common.

In setting up a framework for observing structural relations, and for discernment of differences between structures, it would be impracticable to cover the whole range of structural possibilities within the programs under study. In order to concentrate on those which seem most significant, the investigator has chosen to consider elements from amongst those which the literature has considered common to all curriculum structures, namely, objectives, content and teaching methods.

A Conceptual Framework for Identifying Common Elements in Elementary School Industrial Arts Programs

It has already been stated, while discussing the identification of curriculum elements, that there are a whole range of structural possibilities suggesting both elements and their relationship to each other which could be considered when developing a conceptual framework for a field of specialization. Specific elements, pertinent to elementary school industrial arts, for example, could have been incorporated. Elements of this nature could include physical facilities, tools, equipment and supplies.

This study, however, was delimited to three of the major curriculum elements identified by Taba (1962) as "objectives, content and learning experiences (p. 422)," and by Herrick (1950) as "purpose, content and process (p. 38)." For the purpose of this study, these elements were labelled objectives, content and teaching methods. Under these headings and in terms of the definitions set down in Chapter I, a review of related research, textbooks, and articles in the field of specialization was made to identify statements pertaining to these three elements.

One hundred and fifteen references were identified. These references were then grouped together under areas of agreement and a summarizing statement was constructed relating to each area. The forty-seven statements, together with

the 115-item list of references, was then submitted to thesis committee members who focused attention upon the elimination of duplication, improved clarity and concisement. Every effort was made to maintain the representativeness of the original references.

The resulting fifty-one statements were presented to a committee of two graduate students from the Department of Elementary Education, Faculty of Education, University of Alberta and four past and present executive of the American Council of Elementary School Industrial Arts who had previously contributed lists of programs for description and evaluation and who had indicated a willingness to participate further in the study. The participants were Dr. William A. Downs, Division of Industrial Arts and Technology, Central Missouri State College; Dr. William R. Hoots, Jr., Department of Industrial and Technical Education, East Carolina University; Dr. Mary-Margaret Scobey, School of Education, San Francisco State College; Professor Harold G. Gilbert, Department of Industry and Technology, Northern Illinois Univesity; and Miss B. Blackall and Mr. J. Wicks, University of Alberta.

The graduate students examined the statements for ambiguity, correct structure and homogeneity within the developed framework. The Council members focused attention upon items which could be picked out because of extraneous or incidental grounds as well as further refining the

developed framework by continued structuring in the form of modifications to existing statements.

The final fifty-two statements, the conceptual framework for this study, while not intended to be all inclusive, do project the character of current thought about elementary school industrial arts. As such they act as references for the curricula and instructional decisions made in each of the programs.

Statements Relating to Objectives

1. The program is based on selected practical experiences that provide for an understanding of industry and its workers.

2. The program provides a purpose and goals continuum for industrial arts from elementary school through secondary school.

3. The program promotes occupational awareness by helping the pupil to identify and differentiate a wide variety of occupations.

4. The program is designed to promote consumer knowledge by developing the ability to select, purchase and use wisely the products of industry.

5. Emphasis is placed upon children acquiring worthwhile work attitudes, such as co-operation and appreciation of a job well done.

6. The program aims at encouraging self expression

and creativity through and in a large number of materials and products.

7. Activities in the program are focused upon the correct and skillful use of basic hand tools to process a variety of materials.

8. Consideration is focused on the development of an appreciation of good design and craftsmanship.

9. The program emphasizes activities which provide opportunities for children to develop psychomotor skills.

10. The development of desirable, safe work habits is integrated into the entire program.

11. The program is designed to encourage pupils to act with autonomy and self direction in solving problems and making judgments.

12. Activities in the program are directed toward the development of recreational interests and hobbies.

13. The program emphasizes the opportunity for pupils to explore and experiment with aspects of their experiences in other subjects in the curriculum.

14. The program is designed to increase academic achievement through manipulative experiences involving tools, techniques and materials.

15. The program provides for the study of industry in its totality, including concepts involving labour, capital and distribution.

16. The program provides opportunities for the pupil

to develop self concepts in terms of occupations through involvement in simulated job situations.

17. The program provides the student with knowledge about the world of work, its requirements, demands, rewards and opportunities.

Statements Relating to Content

1. The program is concerned with the historical development of technology and industry and their influences on society and culture.

2. Content places a major emphasis upon concrete experiences dealing with manipulation and explanation of materials, tools and processes.

3. The content is closely correlated with subject matter in other areas of the elementary school curriculum.

4. The content is determined by the teacher alone.

5. Content is primarily concerned with informational topics rather than manipulative type activities.

6. The content is primarily concerned with developing appropriate work habits, and the proper attitude toward the world of work.

7. The content consists of selected industrial concepts and their applied technical experiments.

8. The program emphasizes experience with a variety of current industrial methods, including line production technique, use of jigs and fixtures and the interchangeability of parts.

9. The program is offered as a structured content continuum that follows successively throughout the elementary school years.

10. The program focuses upon the study of the effects of technology on contemporary society.

11. The content is determined through a team approach involving the teacher and an industrial arts specialist.

12. Content is classified under various instructional areas such as mass production, model making, building replicas of inventions, building construction activities, bookbinding, printing, etc.

13. Instructional content focuses upon a single theme for each grade.

14. The content places a major emphasis upon the use of a diversity of materials and allied processes.

15. The content is determined by an industrial arts specialist in terms of objectives he has made for an overall industrial arts program for the school or district.

16. Content is derived from activities that support work done in the other subjects of the elementary school.

17. No attempt is made to allocate certain content material to any particular grade level of the elementary school.

<u>Statements Relating to Teaching Methods</u>

1. The program is taught by an activity centered,

manipulative method.

2. Role playing is advocated as a method to more successfully achieve mastery of the program.

3. Emphasis is placed upon pupils working and planning together as a team.

4. Instruction places emphasis upon the excellence of the final product and the skills and procedures involved in its construction.

5. Diversity in instructional approach is built into the program to accommodate individual differences in ability and interest.

6. Emphasis is placed upon group activities directed towards a common goal rather than individuals working towards separate goals.

7. Instruction is oriented towards problem solving experiences.

8. Pupils are encouraged to progress at their own rate at a number of work stations.

9. Major activities are managed and directed by pupils with the teacher remaining in the background.

10. Activities included in the program are jointly planned by the pupil and teacher.

11. The primary responsibility for developing activities and implementing them into the curriculum lies with the classroom teacher and not the industrial arts consultant.

12. In teaching industrial arts subject matter,

emphasis is not placed on the constructional activity but on the types of learning which occur as a result of it.

13. Activities are usually limited to short blocks of time.

14. The program is not presented on a rigorous daily or weekly schedule but is kept flexible so that the activities can meet the needs of the school and the individual class.

15. An industrial arts consultant directs the activities, the teacher co-operating in planning the work and assisting in carrying out the activities.

16. The program places emphasis upon using community resources (industrial and commercial visits, talks and demonstrations by members of the community).

17. Films and other audio/visual materials form a major part of the instructional program.

18. Activities are co-ordinated with other subjects for enrichment of subject matter.

Development of the Instrument

In selecting an instrument for administering the developed conceptual framework, consideration was initially given to previous research involving the comparative rating of numerous statements. Three studies were identified within the field of industrial arts.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

A Q-sort study by Zullinger (1968) involved a sample of community leaders ranking the importance of statements about seven facets of the industrial education program. The relative importance of the objectives of industrial arts was investigated by Backus (1968). Statements of student behavior characterizing "ideal" attitudes, concepts, skills, knowledges, appreciations, and values were used to prepare a Q-sort instrument. Industrial arts teachers, co-ordinators and superintendents rated the importance of the student behaviors. On the basis of this data Backus compiled a priority order of perceived importance for the nine objectives of industrial arts used to prepare the statements of student behavior. Cochran (1968) compared seven selected programs in industrial arts using a forced choice Q-sort method. Statements relating to objectives, content and teaching methods were ranked by program leaders and common elements within the selected programs identified.

Further, an investigation of literature involving the description of techniques relating to educational research revealed the applicability of the method for the purposes of the study.

Kerlinger (1967) defines Q-sort as a set of procedures centering particularly "in the sorting of decks of cards called Q-sorts and in the correlations among the responses of different individuals to the Q-sorts (p. 581)." He indicates that the number of cards in a Q distribution is

determined by convenience and statistical demands and could range from forty to one hundred. He sees the strength of Q-sort in its usefulness in exploratory research, especially where there is little clear idea of the variables of a field of study but where there is some knowledge of the specific content of the variables. Such is the case with respect to this study.

Nunnally (1970) points out that the Q-sort is "obviously a comparative rating method rather than an absolute rating method (p. 448)" and emphasizes that the major reason for using this method rather than some other comparative rating method is that it greatly conserves the time taken to make ratings. He succinctly describes the suitability of the method:

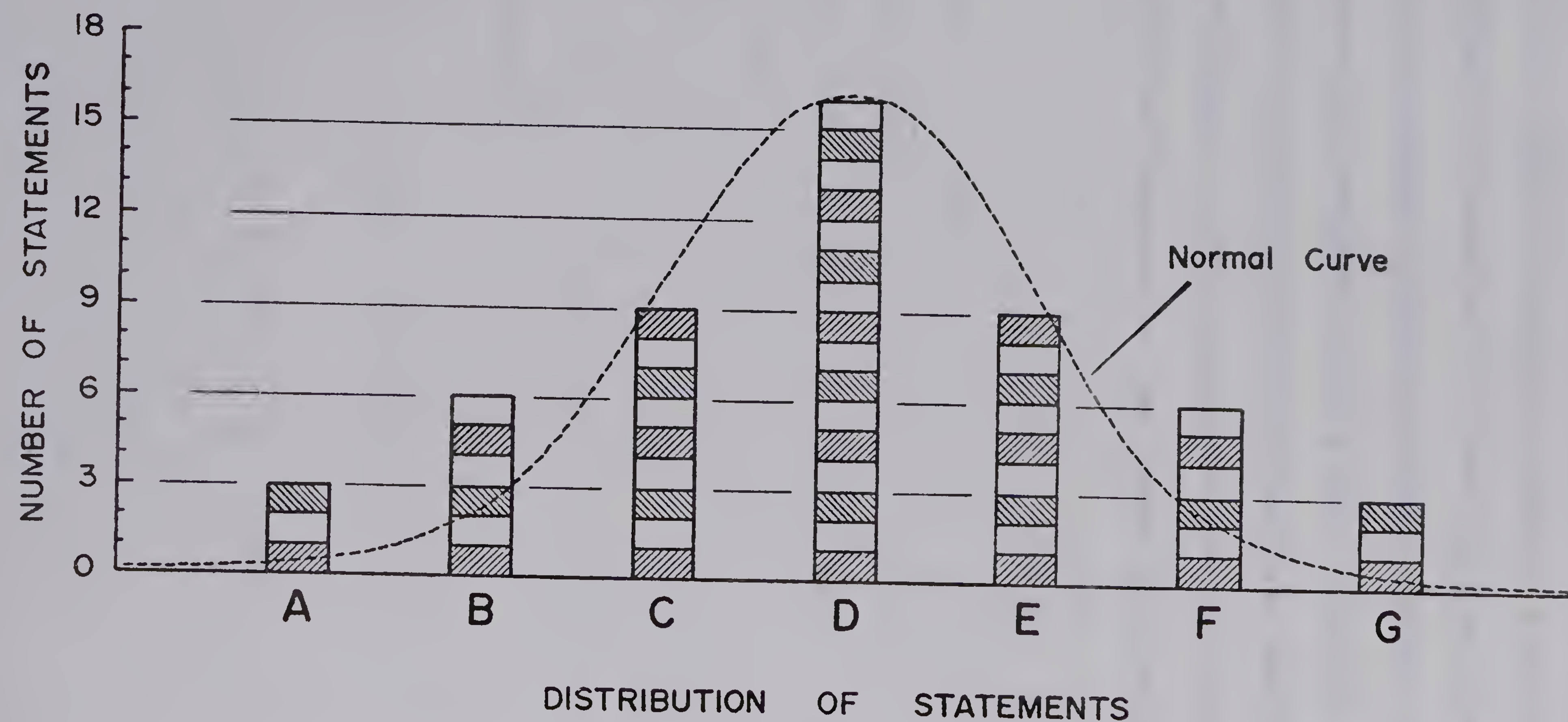
> . . . the Q-sort is a comparative rating method, in which statements or objects are sorted from "most" to "least" with respect to a stated attribute. The Q-sort is nothing more and nothing less than a very handy approach to obtaining comparative responses. Consequently, it is logically very useful in any research problem concerning comparative reactions to a large set of stimuli (p. 460).

Having decided upon the applicability of the Q-technique to the problem, the method was adapted to provide a forced-choice procedure for the study. In this way program leaders could use their own frame of reference to characterize the various programs by arranging the predetermined statements in their order of importance.

The fifty-two statements were placed on cards. These

Figure 2.

Frequency Distribution of Q Sort Statement Cards



cards were numbered at random and then placed in order from one to fifty-two prior to distribution. Further investigation revealed that the Q-technique requires subjects to register responses in terms of a fixed distribution, closely approximating but somewhat flatter than a normal distribution. Consequently, program leaders were asked to sort the cards according to the pre-arranged frequency distribution illustrated in Figure 2. The instruction sheet which accompanied the cards and samples of the cards are included in Appendix D.

CHAPTER V

INTERPRETATION OF DATA

Each of the preceding chapters provided a basis for the data interpreted in this chapter. Following Chapter 1, which set out the plan for the research, a review of the literature was made to provide an overview of the approaches, movements and programs in industrial arts at the elementary level in the United States of America. Chapter 111 described the programs involved in the study with respect to development, objectives and operational aspects and Chapter 1V provided the rationale for the conceptual framework to be used in identifying common elements in the selected contemporary programs described in Chapter 111.

In this chapter, each of these selected contemporary programs was compared with the others under consideration on the basis of the rankings of the statements in the conceptual framework.

Bases for Comparison

The ten program descriptions in Chapter 111 provide a general overview of the programs being studied in this research. These descriptions provide a limited basis for comparison, but, as suggested in the rationale for the study, a systematic analysis is needed to reveal specific similarit-

ies and differences. To achieve this purpose, two different methods were used to compare nine of the ten programs involved in the study.*

The first basis for comparison involved the various rankings on the basis of their frequency of proportion in each of the possible categories. Although this type of presentation did not lend itself to statistical interpretations, it did provide a means of visually comparing the data.

In a second attempt to compare the program rankings of statements contained in the conceptual framework, a factor analysis, involving a rotated factor matrix, was made of the fifty-two statements. Common factors within the statements were identified and named and factor scores computed for each program on each of the identified factors. This was accomplished by using two programs, Factø 1 (Factor Analysis Package) and Factø 8 (Factor Scores), that existed in the program library of the Division of Educational Research Services, University of Alberta. The computer program documentation of both programs is presented in Appendix J. The analysis was carried out on an IBM 360 model 67 computer.

---

*Dr. Fred Dreves, the Director of the Technology for Children Program, Trenton, New Jersey, initially agreed to participate in the study but was not prepared to rank the card sort. He felt that, because of the recent trends in his program, he could not accept some of the statements, developed from what is promulgated in the field, as those which adequately describe his current program.

Ranking of Statements

One way of interpreting the data collected by the developed conceptual framework is to inspect the rankings achieved by each of the statements. Since each of the program directors ranked the statements using Q-sort methodology, an equal number of responses was obtained for each category. These responses are recorded in Tables 1, 2, and 3 according to the code number for each program, with column A receiving three ratings, column B six ratings, column C nine ratings, column D sixteen ratings, column E nine ratings, column F six ratings and column G three ratings. A statement ranked in column A represented the highest degree of support for the statement being most descriptive, while those dispersed in columns B through G represented descending degrees of support.

In an effort to identify common elements within the programs under study, with respect to the manner in which they ranked the fifty-two statements, the following criteria were adopted for identifying positive, neutral and negative support for each statement:-

Criterion 1. If a minimum of seven of the nine program directors ranked a statement in either columns A, B or C, it indicated positive support for that statement. This was interpreted as meaning

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

that the majority of program directors considered it as being most descriptive.

Criterion 2. If a minimum of seven of the nine program directors ranked a statement in either column C, D or E, it indicated a neutral position and could be interpreted as meaning that the program directors did not consider it either most or least descriptive of their respective programs.

Criterion 3. A ranking by at least seven of the nine program directors in columns E, F or G, indicated a negative support for the statement and could be interpreted as meaning that the majority of the program directors saw it as being least descriptive.

The rankings of the fifty-two statements were first recorded under the major headings of Objectives, Content and Teaching Methods and areas of agreement identified in terms of the criteria. Within these groupings, major areas of disagreement were identified both with respect to major differences between various programs and differences in individual programs when compared with the remaining eight. Seventeen statements were grouped under objectives, seventeen under content and eighteen under teaching methods.

All statements receiving general support in terms of the criteria were then listed and common elements identified within the programs under study.

Statements Relating to Objectives

Inspection of Table 1 reveals many of the similarities and differences between the programs under study, in regard to their positions on objectives. Statement number forty-seven, for example, represents a great degree of commonality, as the rankings were closely grouped in columns C, D and E. This was interpreted as meaning that the programs did not take a position, positive or negative, towards the development of an appreciation of good design and craftsmanship. A similar position was taken on statement number twenty-four, with the exception of Project Loom whose director ranked it as being most descriptive. This difference is attributed to the fact that Project Loom stresses occupational awareness. In addition, there was intra-group agreement on the neutrality of statements two, twenty, thirty-two, thirty-four, forty-three and forty-eight, indicating that the majority of program directors saw them as not being statements which most describe or least describe their respective programs. These statements relate to program content (understanding of industry, promotion of consumer knowledge, experimentation and exploration with aspects of other subjects) and affective functions of the programs (development of recreational interests and hobbies, correct and

TABLE 1

RANKING OF STATEMENTS RELATING TO OBJECTIVES ACCORDING TO PROGRAM CODINGS*

Statements	Rating Cards						
	A	B	C	D	E	F	G
2) The program provides a purpose and goals continuum for industrial arts from elementary school through secondary school			3,4 & 9	1,2 & 6	7&8	5	
3) The program emphasizes activities which provide opportunities for children to develop psychomotor skills.	6	1	3,4 7,8 & 9	2&5			
20) Activities in the program are directed toward the development of recreational interests and hobbies.			3	2,5 8&9	6&7	1&4	
23) The program promotes occupational awareness by helping the pupil to identify and differentiate a wide variety of occupations.	1&4		5&9	2,3 6&8		7	
24) The program provides the student with knowledge about the world of work, its requirements, demands, rewards and opportunities.	4		9	1,3 5,6 & 8	2&7		
25) The program provides opportunities for the pupil to develop self concepts in terms of occupations through involvement in simulated job situations.	4	9		1,2 3&8	5&6		7
26) The program is designed to encourage pupils to act with autonomy and self direction in solving problems and making judgements.	2,3 & 7		6	1,4 5,8 & 9			
28) The program is designed to increase academic achievement through manipulative experiences involving tools, techniques and materials.	5,7 & 9	8	4	1,2 3&6			
29) The development of desirable, safe work habits is integrated into the entire program.		6,7 8&9	1,2 3,4 & 5				

TABLE 1--(Continued)

Statements	Rating Cards						
	A	B	C	D	E	F	G
32) The program emphasizes the opportunity for pupils to explore and experiment with aspects of their experiences in other subjects in the curriculum.		2&4	5,6 & 7	1,3 8&9			
34) The program is based on selected practical experiences that provide for an understanding of industry and its workers		4	5&9	3&6	1,7 & 8	2	
39) Emphasis is placed upon children acquiring worthwhile work attitudes, such as co-operation and appreciation of a job well done.	1&9	4,6 & 7	3&8	2&5			
40) The progam aims at encouraging self expression and creativity through and in a large number of materials and products.	6	2,3 & 7	1	5	4,8 & 9		
43) The program is designed to promote consumer knowledge by developing the ability to select, purchase and use wisely the products of industry.			5	1&3	2,4 6,7 8&9		
46) The program provides for the study of industry in its totality, including concepts involving labour, capital and distribution.				2,7 & 4	1	5,3 6&8	9
47) Consideration is focused on the development of an appreciation of good design and craftsmanship.			2&3	5,6 7,8 & 9	1&4		
48) Activities in the program are focused upon the correct and skilful use of basic hand tools to process a variety of materials.			6&7	2,3 & 8	4&5	1&9	

*The rating of each of the programs is reported according to the following code: 1--Kansas City, Missouri, 2--Centennial School District, 3--Project Occupational Versatility, 4--Project Loom, 5--Bertie County Schools, 6--Nova Schools, 7--Technological Exploratorium,K-6, 8-- City School District of Rochester, 9-- Los Angeles School District

skilful use of hand tools).

The response to statement number twenty-nine represents, also, a high degree of commonality, since all the programs ranked the development of desirable, safe work habits in columns B and C. Thus, regardless of basic intent, all program directors view this objective as an integral part of any activity involving the use of tools and materials. In addition, statement number thirty-nine was ranked by seven program directors in columns A, B and C. Kansas City, Missouri and the Los Angeles City School District both ranked the statement as being one of the most descriptive in their respective programs. This would indicate that all programs see the acquisition of worthwhile work attitudes, such as co-operation and appreciation of a job well done as being a point of emphasis rather than a natural by-product of their respective programs. A similar result was obtained by statement number three which emphasised activities which provide opportunities for children to develop psychomotor skills.

Statement number forty-six, which provided for the study of industry in its totality, including concepts involving labour, capital and distribution, appeared to be an objective worthy of little emphasis. While not exactly meeting the criteria, no program director ranked the statement higher than column D, with the Los Angeles City School District program director seeing it as one of the least descriptive statements. Similarly, statement number twenty-

six, which provided for pupils to act with autonomy and self direction, and statement number twenty-eight, which provided for the increase of academic achievement through manipulative experiences involving tools, techniques and materials, were both ranked by all programs in columns A, B, C and D. The City School District of Rochester, Nova Schools, Project Occupational Versatility, Centennial School District and Los Angeles City School District ranked at least one of the statements as being most descriptive of their programs. Thus, even though the two statements do not fall within the criterion set down, it would appear that many programs see these objectives as points of emphasis.

The remaining statements grouped in Table 1 indicated inter-group relationships between selected programs, but little agreement was evident with respect to all nine programs. To illustrate this point, statement number twenty-five provided for the pupil to develop self concepts in terms of occupations through involvement in simulated job situations. Both Project Loom and Los Angeles City School District took a position in favour, while Technological Exploratorium K-6 viewed it as an objective which was least descriptive of the program. The remainder of the programs neither strongly agreed or disagreed with the statement.

Statements Relating to Content

Fifteen of the seventeen statements listed in Table

TABLE 2

RANKING OF STATEMENTS RELATING TO CONTENT ACCORDING TO PROGRAM CODINGS*

Statements	Rating Cards						
	A	B	C	D	E	F	G
1) Content is classified under various instructional areas such as mass production, model making, building replicas of inventions, building construction activities, bookbinding, printing, etc.				2,5 6&9	3,7 & 8	1&4	
4) The program is offered as a structured content continuum that follows successively throughout the elementary school years.				4,7 & 9	1,3 5&6	2&8	
5) The program is concerned with the historical development of technology and industry and their influences on society and culture.			5	1,2 & 7	4,6 & 9	3&8	
6) Content is primarily concerned with informational topics rather than manipulative type activities.				8		1,2 3,4 7&9	5&6
7) The content is determined by the teacher alone.				8	2	4&9	1,3 5,6 & 7
10) The content consists of selected industrial concepts and their applied technical experiments.				6&7	4,5 & 9	1	2,3 & 8
12) The program emphasizes experience with a variety of current industrial methods, including line production technique, use of jigs and fixtures and the interchangeability of parts			2&8	1,3 4,5 6,7 & 9			
14) The content is closely correlated with subject matter in other areas of the elementary school curriculum.	5,6 8&9	1,4 & 7		2	3		
16) The content is determined through a team approach involving the teacher and an industrial arts specialist		1,2 & 8		3,4 5,6 7&9			

TABLE 2--(Continued)

Statements	Rating Cards						
	A	B	C	D	E	F	G
17) No attempt is made to allocate certain content material to any particular grade level of the elementary school.			2&3	1,4 8&9	5	6	7
27) The content is primarily concerned with developing appropriate work habits, and the proper attitude towards the world of work.			1,3 4,6 & 9	5,7 & 8	2		
31) Content places a major emphasis upon concrete experiences dealing with manipulation and exploration of materials, tools and processes.		4&5	1,6 7&8	2,3 & 9			
36) The content is determined by an industrial arts specialist in terms of objectives he has made for an overall industrial arts program for the school or district.			9	6	2&3	1,7 & 8	4&5
38) Content is derived from activities that support work done in the other subjects of the elementary school.		5,6 & 8	1,2 4,7 & 9	3			
45) The program focuses upon the study of the effects of technology on contemporary society.	7	5		1,4 & 9	2&8	3&6	
49) Instructional content focuses upon a single theme for each grade.					9	2,5 6,7 & 8	1,3 & 4
50) The content places a major emphasis upon the use of a diversity of materials and allied processes.		7	2&6	3&5	1,4 & 8	9	

*The rating of each of the programs is reported according to the following code: 1--Kansas City, Missouri, 2--Centennial School District, 3--Project Occupational Versatility, 4--Project Loom, 5--Bertie County Schools, 6--Nova Schools, 7--Technological Exploratorium,K-6, 8--City School District of Rochester, 9--Los Angeles School District

2 reveal an intra-group relationship of the programs when the criteria were applied. Of these statements, six, seven, ten, thirty-six and forty-nine took a negative position. This indicated a lack of emphasis with respect to content concerned primarily with informational topics rather than manipulative type activities and content focusing upon a single theme for each grade. Further, programs placed little emphasis upon content being determined by the teacher or by an industrial arts specialist in terms of objectives relating to an overall industrial arts program.

Statements number one, four and five each have at least seven nominations in columns C, D and E. All programs ranked these statements in columns D, E or F with the exception of Bertie County Schools whose director ranked content involved with the historical development of technology and industry in column C. Thus, while these statements can be said to be neutral in terms of the criterion being used, they would appear to indicate general agreement that content classified under various instructional areas, a structured content continuum and content concerned with the historical development of technology and industry, tends to be less descriptive than neutral in most programs. A similar but not as strong inter-group agreement is evident in statements number seventeen and fifty which relate to the allocation of certain content material to particular grade levels and the placement of major emphasis upon the use of a diversity of materials and allied processes.

A neutral position was also taken on statements twelve and twenty-seven, as all programs ranked statement twelve in columns C and D and statement twenty-seven in columns C, D and E. Little concern was expressed in regard to students experiencing a variety of current industrial methods, the development of appropriate work habits and the proper attitude towards the world of work.

A more positive position was taken with respect to statements thirty-one and thirty-eight. While statement thirty one is neutral and statement thirty-eight is positive according to the criteria, all rankings for both statements were made in columns B, C and D. This intragroup relationship demonstrated the agreement with which all programs saw experiences dealing with the manipulation and exploration of materials, tools and processes and activities that support other subjects of the elementary school.

A positive position was taken with respect to statement fourteen. Four programs, Bertie County Schools, Nova Schools, City School District of Rochester and Los Angeles City School District, ranked the statement as one which best described their respective programs, indicating that concern was expressed for content being closely correlated with subject matter in other areas of the elementary school curriculum.

Of the remaining statements listed under content, statement number forty-five represents major differences in

opinion between the program directors as to emphasis. This statement was ranked in the highest category, column A, by Technological Exploratorium K-6 and in the next but lowest category by Project Occupational Versatility and Nova Schools. It would appear that the programs under investigation are placing a variety of emphasis upon the study of the effects of technology upon contemporary society.

Content Relating To Teaching Methods

An inspection of Table 3 reveals that the most common agreement among the eighteen statements grouped under teaching methods was for statements eleven and forty-two. Rankings in columns C,D and E for statement eleven and, with the exception of Centennial School District, whose director ranked in column C, all ranking in column D for statement Forty-two, suggests considerable intra-group strength for a neutral position on the use of community resources and pupils working and planning together as a team. With the exception of Los Angeles City School District, who ranked statement fifteen in column B, common agreement is also evident with respect to role playing being used as a method to more successfully achieve mastery of the program. Seven of the remaining eight program directors adopted a neutral position, ranking the statement in columns D and E. The same trend is evident in statement nineteen and twenty-one. In this instance, Project Occupational Versatility agrees with children progressing at their own rate at a

TABLE 3

RANKING OF STATEMENTS RELATING TO TEACHING METHODS ACCORDING TO PROGRAM CODINGS*

Statements	Rating Cards						
	A	B	C	D	E	F	G
8) Activities are usually limited to short blocks of time.			4,8 & 9		1,3 5&6	2&7	
9) Instruction places emphasis upon the excellence of the final product and the skills and procedures involved in its construction.				7	3	2,4 5,6 & 9	1&8
11) The program places emphasis upon using community resources (industrial and commercial visits, talks and demonstrations by members of the community).			1&7	4,5 & 8	2,3 6&9		
13) The primary responsibility for developing activities and implementing them into the curriculum lies with the classroom teacher and not the industrial arts consultant.		5	3&4	1,7 & 8	2		6&9
15) Role playing is advocated as a method to more successfully achieve mastery of the program.		9		1,4 6&5	2,3 & 8	7	
18) Films and other audio/visual materials form a major part of the instructional program.		3		9	1,4 5,6 & 7		2&8
19) Pupils are encouraged to progress at their own rate at a number of work stations.		3		1,2 4,5 & 7	8&9	6	
21) Diversity in instructional approach is built into the program to accommodate individual differences in ability and interest.	3	1	5,6 7&8	2,4 & 9			
22) In teaching industrial arts subject matter, emphasis is not placed on the constructional activity but on the types of learning which occur as a result of it.	5	3&6	1&8	2,4 7&9			

TABLE 3--(Continued)

Statements	Rating Cards						
	A	B	C	D	E	F	G
30) Major activities are managed and directed by pupils with the teacher remaining in the background.	3	2		6&7	1&4	5&8	9
33) Instruction is oriented towards problem solving experiences.		1,2 3,7 & 9	6&8	4	5		
35) The program is taught by an activity centered manipulative method.		1,3 8,4 5&6	2&7		9		
37) Emphasis is placed upon group activities directed towards a common goal rather than individuals working towards separate goals.		6	1	3,8 & 9	5&7	4	2
41) The program is not presented on a rigorous daily or weekly schedule but is kept flexible so that the activities can meet the needs of the school and the individual class.	2	8&9	1,4 & 5	6&7		3	
42) Emphasis is placed upon pupils working and planning together as a team.			2	1,3 4,5 6,7 8&9			
44) An industrial arts consultant directs the activities, the teacher co-operating in planning the work and assisting in carrying out the activities.	2&8				1,6 & 7	3,5 & 9	4
51) Activities included in the program are jointly planned by the pupil and teacher.		5	2,6 & 8	1,3 4&7	9		
52) Activities are co-ordinated with other subjects for enrichment of subject matter.	1&8	2&9	5&7	4&6	3		

*The rating of each of the programs is reported according to the following code: 1--Kansas City, Missouri, 2--Centennial School District, 3--Project Occupational Versatility, 4--Project Loom, 5--Bertie County Schools, 6--Nova Schools, 7--Technological Exploratorium,K-6, 8--City School District of Rochester, 9--Los Angeles School District

number of work stations and diversity of approach being built into the program,while the remainder of the program directors take a neutral position.

Statements eight and fifty-one, while being neutral in terms of the criterion, show far less intra-group agreement with respect to limiting activities to short blocks of time and the pupil and teacher jointly planning activities.

By ranking statement number thirty-five in columns B and C, all but one program indicated a positive position in regard to their respective programs being taught by an activity centered, manipulative method. The Los Angeles City School District director ranked the statement in column E indicating a negative position with respect to the statement. Positive support was also demonstrated for statement number thirty-three. This represented an acceptance that instruction is oriented towards problem solving experiences.

Statements number twenty-two, forty-one and fifty-two, while not satisfying the criterion set down for positive support, each have program rankings in columns A, B, C and D. The only exception is Los Angeles City School District, whose director ranked statement fifty-one in column E. This concentration of rankings in the positive or most descriptive columns indicates that all programs place emphasis upon learning arising from the constructional activity, the program being kept flexible so that activities can meet the

needs of the school and the individual class, and activities being co-ordinated with other subjects for enrichment of subject matter.

Statements number nine, eighteen and forty-four take a negative position in terms of the criterion. Statement number nine exhibits the greatest degree of commonality, no program director ranking instruction placing emphasis upon the final product and the skills and procedures involved in its construction any higher than column D. Less agreement was evident in statements eighteen and forty-four. Centennial School District and City School District of Rochester, for example, considered the industrial arts teacher directing the activities and co-operating with the classroom teacher in planning and carrying out activities as being most descriptive of their respective programs. The remainder of the program directors ranked the statement in columns E, F and G, indicating a negative support for the statement.

The remaining statements listed under teaching methods showed little agreement with respect to all nine programs, the statements being dispersed throughout the rating columns. Some major differences are represented in this respect. For example, statement number thirty represents the two possible extremes in rating a statement. It was ranked in the highest category by Project Occupational Versatility and in the lowest category by Los Angeles City School District. The remaining program directors ranked the statement in all other columns except column C, indicat-

[illegible]

ing little agreement as to whether or not activities should be managed by pupils with the teacher remaining in the background.

Common Elements As Identified By Ranking Of Statements

Areas of common agreement as they relate to statements pertaining to objectives, content and teaching methods have already been identified, together with a number of areas of agreement which did not satisfy the criteria set down at the beginning of this chapter. In an effort to identify the overall concensus expressed by the nine program directors through their respective ranking of statements, the three positions taken in terms of areas of agreement were compared for identified common elements.

Statements Showing Positive Support. The following statements were ranked by at least seven of the nine program directors in either columns A, B or C.

(14) The content is closely correlated with subject matter in other areas of the elementary school curriculum.

(29) The development of desirable, safe work habits is integrated into the entire program.

(33) Instruction is oriented towards problem solving experiences.

(35) The program is taught by an activity centered, manipulative method.

(38) Content is derived from activities that support work done in the other subjects of the elementary school.

(39) Emphasis is placed upon children acquiring worthwhile work attitudes, such as co-operation and appreciation of a job well done.

Statements Showing Neutral Support The following statements were ranked by at least seven of the nine program directors in either columns C, D, and E.

(1) Content is classified under various instructional areas such as mass production, model making, building replicas of inventions, building construction activities, bookbinding, printing, etc.

(2) The program provides a purpose and goals continuum for industrial arts from elementary school through secondary school.

(3) The program emphasises activities which provide opportunities for children to develop psychomotor skills.

(4) The program is offered as a structured content continuum that follows successively through the elementary school years.

(5) The program is concerned with the historical development of technology and industry and their influences on society and culture.

(11) The program places emphasis upon using community resources (industrial and commercial visits, talks and demonstrations by members of the community).

(12) The program emphasises experience with a variety of current industrial methods, including line product-

ion technique, use of jigs and fixtures and the interchangeability of parts.

(15) Role playing is advocated as a method to more successfully achieve mastery of the program.

(17) No attempt is made to allocate certain content material to any particular grade level of the elementary school.

(19) Pupils are encouraged to progress at their own rate at a number of work stations.

(20) Activities in the program are directed toward the development of recreational interests and hobbies.

(21) Diversity in instructional approach is built into the program to accommodate individual differences in ability and interest.

(24) The program provides the student with knowledge about the world of work, its requirements, demands, rewards and opportunities.

(27) The content is primarily concerned with developing appropriate work habits, and the proper attitude toward the world of work.

(31) Content places a major emphasis upon concrete experiences dealing with manipulation and explanation of materials, tools and processes.

(32) The program emphasises the opportunity for pupils to explore and experiment with aspects of their experiences in other subjects in the curriculum.

(34) The program is based on selected practical experiences that provide for an understanding of industry and its workers.

(42) Emphasis is placed upon pupils working and planning together as a team.

(43) The program is designed to promote consumer knowledge by developing the ability to select, purchase and use wisely the products of industry.

(47) Consideration is focused on the development of an appreciation of good design and craftsmanship.

(48) Activities in the program are focused upon the correct and skilful use of basic hand tools to process a variety of materials.

(50) The content places a major emphasis upon the use of a diversity of materials and allied processes.

(51) Activities included in the program are jointly planned by the pupil and teacher.

Statements Showing Negative Support The following statements were ranked by at least seven of the nine program directors in columns E, F or G.

(6) Content is primarily concerned with informational topics rather than manipulative type activities.

(7) Content is determined by the teacher alone.

(9) Instruction places emphasis upon the excellence of the final product and the skills and procedures involved in its construction.

(10) The content consists of selected industrial concepts and their applied technical experiments.

(18) Films and other audio/visual materials form a major part of the instructional program.

(36) The content is determined by an industrial arts specialist in terms of objectives he has made for an overall industrial arts program for the school or district.

(44) An industrial arts consultant directs the activities, the teacher co-operating in planning the work and assisting in carrying out the activities.

(49) Instructional content focuses upon a single theme for each grade.

Of the fifty-two statements in the conceptual framework, thirty seven satisfied the criteria, six indicating positive support, twenty three neutral support and eight negative support. The concentration in the neutral position (columns C, D and E) is to be expected, as the forced rating required each program director to rank thirty-four of the possible fifty-two statements in these three columns. By comparison, positive and negative positions as indicated by groupings in columns A, B C and D, E, F, respectively, required that program directors rank a maximum of eighteen statements in each of the three columns.

The six statements in the positive support grouping indicate that the majority of programs see them as most descriptive. Statements number twenty-nine and thirty-nine relate closely to the traditional philosophy associated with

programs involving tools, materials and processes, namely the development of desirable, safe work habits and the acquisition of worthwhile work attitudes such as co-operation and an appreciation of a job well done. Statement fourteen and statement thirty-eight both indicate that the programs under investigation view elementary school industrial arts as playing a supportive role for other subjects in the elementary school with content closely correlated with subject matter being taught in other areas of the curriculum. The remaining two statements, which the majority of program directors considered as being most descriptive, relate to the emphasis which is placed upon manipulative activities and problem solving experiences.

When the six statements which showed positive agreement were compared with the seven other statements which indicated positive emphasis but did not meet the criterion, added emphasis was given to the elements outlined above. Statement number three supports the traditional philosophy for industrial arts by emphasising activities which provide opportunities for children to develop psychomotor skills. The significance of a supportive role for elementary school industrial arts is emphasised by statements number fifty-two and twenty-eight which indicate common agreement for activities being co-ordinated with other subjects for enrichment of subject matter and the increase of academic achievement through manipulative experiences involving tools, techniques and materials.

[illegible]

The emphasis on manipulative experiences is strengthened by statement number thirty-one, which involved the use of concrete experiences dealing with the manipulation and explanation of materials, tools and processes. Statements number twenty-six and twenty-two relate to the emphasis placed upon pupils acting with autonomy and self direction in solving problems and to the emphasis placed upon learning arising from construction activities rather than the activity itself. These two statements support the emphasis placed upon problem solving experiences in statement number thirty-three. The remaining statement, which received positive support but which did not satisfy the criterion, was statement number forty-one which indicated agreement that elementary industrial arts programs should be kept flexible so that they can meet the needs of the school and the individual class.

An examination of the statements which received general negative support emphasises the areas of positive agreement. Content concerned with informational topics rather than manipulative type activities is ranked as being least descriptive. Content consisting of selected industrial concepts is also seen by the majority of programs as being least descriptive. This indicates the emphasis upon programs drawing their content from other subject fields in the curriculum and indicates a possible lack of support for specific subject content in elementary school industrial arts. Statement number forty-six, while not meeting the

[illegible]

criterion, did indicate a general agreement that it was least descriptive of programs involved in the study, in that no program ranked it higher than column D. As this statement relates to the provision for the study of industry in its totality, including concepts involving labour, capital and distribution, it appears to add weight to the lack of support for specific subject content. Statement number five, in a similar manner, gained little positive support, indicating a lack of concern for the inclusion of the historical development of technology and industry and their influences on society and culture. Other statements relating to specific content involving industry, occupational awareness and the world of work, showed widespread differences of opinion as to their importance. Statements number thirty-four and forty-three, however, were placed in a neutral position in terms of the criterion employed. These statements relate to the provision for an understanding of industry and the development of consumer knowledge.

Statement number nine, which refers to emphasis being placed upon the excellence of the final product and the skills and procedures involved in its construction, was considered as being least descriptive and again indicates that program directors place emphasis upon the learning which occurs as a result of the activities and not upon the activities themselves.

It would appear that there is little emphasis placed upon the content being determined by the teacher alone.

[illegible]

Similarly, content being determined by an industrial arts specialist in terms of objectives he has made for an over-all industrial arts program received general negative support, but, as the program descriptions in Chapter 111 indicate, a number of programs do employ this method. Statement number forty-four was ranked in columns E, F and G by all programs except Centennial School District and City School District of Rochester. These program directors consider the industrial arts specialist directing activities after co-operating with the teacher in planning the work as being one of the statements most descriptive of their programs.

It is obvious that all programs see the need for an industrial arts specialist or consultant. There is no general agreement as to his function, however, although most program directors cannot consider him directing the activities in the classroom or determining an overall program for the school or district. His function would appear to be that of an adviser, co-operating with the teacher in planning activities and developing a separate activity plan to suit the needs of each class.

Little emphasis is placed upon a structured program of activities. This is evidenced by the negative support for content focusing upon a single theme for each grade. While not meeting the criterion, statements one and four did receive a generally negative support for content classified under various instructional areas and for the program being offered as a structured content continuum. These statements,

combined with the positive support received for a flexible schedule of activities, clearly indicate a general agreement that the elementary school industrial arts program should not be tied to a fixed timetable or content structure.

The statements which remain in the neutral position for common agreement, after those which show a visual positive or negative tendency have been related to identifiable positive or negative common elements, indicate a variety of approaches and no visually identifiable common elements.

Inter-Group Statement Rankings

While it is not the purpose of this study to compare any one program with the eight other programs under study, the distribution of data presented in Tables 1, 2 and 3 reveals that a number of the statements were ranked in a similar manner by some program directors. A comparison of these rankings is illustrated in Table 4, which allows the number of like responses for each program to be determined.

The "O" column represents the number of responses from the compared programs which were ranked in the same column. The number of statements listed in column "1" represents a positional difference of one in the original rating of the statement, column "2" represents a positional difference of two, and so forth. Since columns "O" and "1" represent similar positions on a particular statement, the two combined can be used to determine a degree of inter-group agreement between the programs.

TABLE 4

INTER-GROUP COMPARISON OF STATEMENT RANKINGS
BASED ON DIFFERENCES IN RESPONSE RANGE

COMPARED PROGRAMS		Centennial School District							Project Occupational Versatility							Project Loom						
		Difference Range							Difference Range							Difference Range						
		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Kansas City Missouri	No.	10	23	13	4	2	-	-	17	18	9	6	2	-	-	23	17	7	5	-	-	-
Centennial School District	No.	-	-	-	-	-	-	-	16	20	11	2	-	3	-	10	16	17	6	2	-	1
Project Occupational Versatility	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	16	13	10	1	-	-
Project Loom	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	21	11	3	1	-	-
Bertie County Schools	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nova Schools	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Technological Exploratorium K-6	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
City School District Of Rochester	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Angeles City School District	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 4--(Continued)

COMPARED PROGRAMS		Bertie County Schools							Nova Schools							Technological Exploratorium K-6						
		Difference Range							Difference Range							Difference Range						
		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Kansas City Missouri	No.	13	23	13	3	-	-	-	14	24	10	4	-	-	-	17	21	5	8	-	1	-
Centennial School District	No.	9	20	13	8	1	1	-	10	22	13	5	1	1	-	14	20	11	4	3	-	-
Project Occupational Versatility	No.	12	20	10	7	2	1	-	16	22	7	4	3	-	-	11	21	12	6	1	1	-
Project Loom	No.	16	21	11	3	1	-	-	12	21	12	3	4	-	-	15	20	7	7	1	1	1
Bertie County Schools	No.	-	-	-	-	-	-	-	21	16	8	5	1	1	-	14	20	14	4	-	-	-
Nova Schools	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	17	12	3	-	1	-
Technological Exploratorium K-6	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
City School District Of Rochester	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Los Angeles City School District	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 4--(Continued)

COMPARED PROGRAMS		City School District Of Rochester							Los Angeles City School District													
		Difference Range							Difference Range							Difference Range						
		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
Kansas City Missouri	No.	16	24	9	2	1	-	-	12	22	14	4	-	-	-							
Centennial School District	No.	15	25	6	5	1	-	-	12	14	12	12	-	2	-							
Project Occupational Versatility	No.	15	19	8	4	3	3	-	13	16	11	8	3	-	1							
Project Loom	No.	10	25	11	5	-	-	1	21	14	13	2	2	-	-							
Bertie County Schools	No.	15	23	9	4	-	1	-	14	22	7	7	1	1	-							
Nova Schools	No.	15	19	11	5	2	-	-	13	22	10	6	1	-	-							
Technological Exploratorium K-6	No.	14	17	10	9	2	-	-	13	18	7	11	2	1	-							
City School District Of Rochester	No.	-	-	-	-	-	-	-	15	20	11	5	-	1	-							
Los Angeles City School District	No.	-	-	-	-	-	-	-	-	-	-	-	-	-	-							

These groupings illustrate the degree of commonality between the various programs on the fifty-two statements. The highest inter-group agreement was shown between Kansas City, Missouri and Project Loom; Kansas City, Missouri and City School District of Rochester; and Centennial School District and City School District of Rochester. In each instance, forty of the fifty-two statements were listed in columns "0" and "1" of Table 4. The lowest inter-group agreement, in this respect, was shown between Project Loom and City School District of Rochester, twenty-five of the fifty-two statements being listed in columns "0" and "1". It must be noted, however, that disagreemnet on a few selected statements can completely alter this type of relationship between programs. On the other hand, it does illustrate that, regardless of individual direction, there are many existing points of agreement among the nine programs. The following listing of twelve groupings illustrates the commonality between various programs on the fifty-two statements. In each of these cases, 36 or more than seventy percent of statements were listed in columns "0" and "1".

40/52 -- Kansas City Missouri and City School District of Rochester.

40/52 -- Centennial School District and City School District of Rochester.

40/52 -- Kansas City, Missouri and Project Loom.

38/52 -- Kansas City, Missouri and Nova Schools.

38/52 -- Kansas City, Missouri and Technological Exploratorium K-6.

38/52 -- Project Occupational Versatility and Nova Schools.

38/52 -- Bertie County Schools and City School District of Rochester.

37/52 -- Bertie County Schools and Nova Schools.

37/52 -- Project Loom and Bertie County Schools.

36/52 -- Kansas City, Missouri and Bertie County Schools.

36/52 -- Centennial School District and Project Occupational Versatility.

36/52 -- Bertie County Schools and Los Angeles City School District.

36/52 -- Nova Schools and Technological Exploratorium K-6.

Statistical Framework

To permit a further interpretation, a principal components factor analysis was carried out on the raw data. This enabled the resolution of a set of variables linearly in terms of a small number of categories or factors (Harman, 1968, p. 1.1). So that the resultant findings could be related to the findings from the visual interpretation of the data, the factor scores were computed for each program on each factor.

Factor Analysis

As mentioned, the factor analysis procedure existing in the program library of the Division of Educational Research Services, University of Alberta, was used in this investigation. This program carried out a principal components factor analysis from the raw data by calculating the correlations between the fifty-two statements in the conceptual framework and then automatically applying Varimax, Quartimax and Equimax orthogonal rotations to these principal axes factors.

The three output rotated matrices, Varimax, Quartimax and Equimax, were then analysed to determine which rotation appeared the most meaningful. Although the three rotations were quite similar, the Varimax factor rotation, which extracted the maximum amount of variance, was selected as yielding factors which best conveyed essential information relating to the original set of variables.

Total variance was extracted in eight factors. All statements with factor loadings in excess of an arbitrary value of 0.8 were first considered to be the statements which best defined a particular factor. This loading was reduced 0.05 at a time until groupings of statements began to appear. At a factor loading of 0.65, a degree of commonality for the statements, under each of the extracted factors, was evident. A further drop in factor loading introduced a number of statements which did not relate to the previously identified statement groupings.

At the factor loading level 0.65, only two statements were contained within each of Factors V11 and V111. It was decided that two statements would not be sufficient to make a generalization for economy of description and therefore Factor V11 and Factor V111 were added to the remaining unique factor which related to the remaining statements in the conceptual framework. These statements are not common to all programs and therefore take into account the uniqueness of each program. The remaining factors, Factor 1 through V1, included reference to thirty-eight of the fifty-two statements when a factor loading of 0.65 was used and involved the extraction of 83.886% of the variance. The Varimax rotated factor matrix for these six factors is presented in Table 5.

To interpret the categories listed under the six factors, it was necessary to name or identify each of the factors in terms of the commonality of the statements contained in each. This was accomplished by analyzing the variables to determine the common elements present. The six factors named were as follows:

Factor 1. -- Functional Activities

Factor 2. -- Content Determinants

Factor 3. -- Specialized/Affective Functions

Factor 4. -- Instructional Organization

Factor 5 -- Operational Base

Factor 6 -- Pupil Goals

The statements which define these six factors, toge-

TABLE 5

FACTOR ANALYSIS

FACTOR LOADINGS FOR VARIMAX ROTATED FACTOR MATRIX

Statement Number*	Factors					
	I	II	III	IV	V	VI
1	.20	.04	.31	.09	.88	.10
2	-.35	-.30	-.27	-.62	.08	.11
3	.08	-.23	.54	-.20	-.27	-.42
4	-.15	-.81	.11	-.37	-.25	.10
5	.12	-.00	.09	.23	-.15	.28
6	-.12	.63	-.10	-.15	-.17	-.15
7	-.23	.74	.06	-.02	.16	.29
8	-.80	-.04	.20	-.03	.00	-.05
9	.67	-.57	-.22	-.21	.08	.16
10	.15	-.66	.64	-.03	-.17	.14
11	.12	.08	.04	.06	-.86	-.16
12	.09	.89	-.04	.08	.21	.26
13	-.00	-.06	-.62	.60	-.40	.00
14	-.33	-.03	.85	.19	-.13	-.11
15	-.80	-.23	.30	-.22	.32	-.08
16	-.06	.95	-.09	-.06	-.22	-.05
17	-.52	.38	-.64	-.08	.25	.04
18	-.04	-.76	-.41	-.19	.16	-.43
19	.13	-.17	-.97	.03	-.08	-.08
20	.17	.12	-.37	.10	.83	-.23
21	.29	-.13	-.47	.13	-.13	-.77
22	.07	-.20	-.03	.74	.25	-.51
23	-.83	-.05	-.12	.08	-.38	.04
24	-.74	-.44	.02	.03	-.23	.27
25	-.86	-.08	-.16	-.19	.04	.28
26	.81	-.02	-.44	-.25	.20	.18
27	-.42	-.63	.10	-.21	-.20	-.46
28	-.10	-.16	.28	.05	.12	-.00
29	.23	.00	.74	-.32	.18	-.21
30	.61	-.02	-.60	-.06	.12	.12
31	-.20	-.26	.27	.68	-.55	.18
32	.16	-.08	.02	.22	-.10	.93
33	.32	.24	-.18	-.85	.05	-.22
34	-.60	-.74	.07	.22	.03	.12
35	.19	.04	-.17	.72	-.45	-.15
36	-.00	-.05	.28	-.64	.64	-.18
37	-.01	-.18	.46	-.05	-.03	-.80
38	-.07	.26	.77	.56	.04	.01
39	-.29	-.31	.35	-.66	-.40	-.30
40	.80	-.10	-.03	-.08	.09	-.07
41	-.38	.67	.30	-.10	.09	.47
42	.21	.56	-.24	-.13	.30	.61

TABLE 5--(Continued)

Statement Number	Factors					
	1	11	111	1V	V	V1
43	-.13	-.16	-.39	.59	.03	-.40
44	.27	.92	.08	.01	.16	.11
45	.16	-.19	.09	.07	-.35	.16
46	.37	.12	-.23	-.06	-.60	.65
47	.49	.17	-.37	-.02	.76	.03
48	.86	-.03	.18	.18	.10	.13
49	-.01	.12	.56	.24	.62	.08
50	.94	-.07	.05	.14	-.01	.25
51	.24	.30	.13	.88	.14	.11
52	-.26	.80	.26	-.20	-.18	-.13

*The statement numbers refer to the statements developed in Chapter 1V and listed in Appendix

ther with their loadings, are presented in Appendix H.

Factor 1 -- Functional Activities. This factor involved the consideration of ten statements and was concerned, in general, with the types of activities in the programs. there was an indication that emphasis was being placed upon activities involving orientation to the world of work and the use of a wide variety of materials. Statements number twenty-three, twenty-four and twenty-five, for example, all contain reference to involvement in simulated job situations and knowledge about the world of work. Statements number forty, forty-eight and fifty all relate to the program involving the use of a diversity of materials.

Factor 11 -- Content Determinants. The ten statements considered were concerned with the development of content, particularly with respect to how the content was determined and, to a lesser extent, on the substance of the

content in programs. Five of the ten statements, numbers four, seven, sixteen, forty-one and forty-four all related to factors which determined the content of the programs.

Factor 111 -- Specialized/Affective Functions. This factor was defined by statements number fourteen, nineteen, twenty-nine and thirty eight. Statements number fourteen and thirty-eight both related to the supportive role the programs play in the elementary school, while the remaining statements related to individual pupil progress and the development of safe work habits.

Factor 1V -- Instructional Organization. The six statements which defined this factor were concerned with how instruction was organized to produce desired outcomes. Statements number twenty-two, thirty-one, thirty-three, thirty-five and thirty-nine all relate to the types of experiences, attitudes and learning developed in the pupil by different instructional methods.

Factor V -- Operational Base. The four statements considered in this factor were concerned with how the program operates and with what purpose. Statements number one and eleven relate to the use of various instructional areas and to the emphasis the programs place upon the use of various community resources. The remaining statements refer to desired outcomes from program organization.

Factor V1 -- Pupil Goals. Three of the four statements considered in this factor emphasised provision being made for pupils to explore, experiment and develop individ-

uality. For example, statement number twenty-one stresses an instructional approach which accommodates for individual differences in ability and interest, while statement number thirty-two emphasises provision for pupils to explore and experiment.

Factor Scores

In an effort to relate the common elements within the statements, as identified by the factor analysis, to the initial visual description of the rating distributions, factor scores were computed for each program on each of the six factors previously described. The resultant emphasis placed upon each of the factors by the various programs under study is shown in Table 6. The factor scores were based on a scaling factor with a mean of fifty and a standard deviation of ten.

The factors within which each program obtained a factor score greater than the mean is listed below.

Kansas City, Missouri.

Factor V - Operational Base

Centennial School District

Factor l - Functional Activities

Factor ll - Content Determination

Factor lll - Specialized Affective Functions

Factor Vl - Pupil Goals

Project Occupational Versatility

Factor l - Functional Activities

TABLE 6

FACTOR SCORES

Mean -- 50

Standard Deviation -- 10

COMPARED PROGRAMS	Factor Scores					
	I	II	III	IV	V	VI
Kansas City Missouri	45.13	49.08	48.47	39.58	55.65*	35.06
Centennial School District	67.82*	63.59*	50.48*	45.87	40.01	56.51*
Project Occupational Versatility	61.76*	36.69	32.03	45.77	57.48*	54.78*
Project Loom	36.69	46.45	46.91	36.86	35.64	47.83
Bertie County Schools	44.22	43.52	65.36*	45.15	58.36*	69.46*
Nova Schools	50.34*	45.22	52.57*	64.63*	59.79*	42.19
Technological Exploratorium K-6	57.18*	40.34	62.60*	58.99*	36.99	41.67
City School District Of Rochester	49.45	67.63*	53.80*	47.10	61.77*	44.39
Los Angeles City School District	37.43	57.49*	37.78	66.04*	44.32	58.12*

Factor V - Operational Base

Factor Vl - Pupil Goals

Project Loom

No factor scores above mean.

Bertie County Schools

Factor lll - Specialized-Affective Functions

Factor V - Operational Base

Factor Vl - Pupil Goals

Nova Schools

Factor l - Functional Activities

Factor lll - Specialized-Affective Functions

Factor lV - Instructional Organization

Factor V - Operational Base

Technological Exploratorium K-6

Factor l - Functional Activities

Factor lll - Specialized -Affective Functions

Factor lV - Instructional Base

City School District of Rochester

Factor ll - Content Determination

Factor lll - Specialized-Affective Functions

Factor V - Operational Base

Los Angeles City School District

Factor ll - Content Determination

Factor lV - Instructional Organization

Factor Vl - Pupil Goals

Project Loom did not have a factor score above the mean for any of the factors. This would indicate that this

program showed no strong emphasis upon any of the identified factors. Factor scores ranging from 35.64 to 47.83 does, however, illustrate a degree of relevance. Reference to Tables 1, 2, and 3, especially statements twenty-four, twenty-five, forty-four and, to some lesser extent, statements one, thirty-one, thirty-six and forty-four, indicates the divergent position this program took on some statements. This would imply that Project Loom is placing emphasis upon something else other than areas identified by the factor analysis.

Kansas City, Missouri had one factor score above the mean but three others above 45.13, indicating the relevance of the identified factors to the program but showing no marked emphasis upon more than one factor.

The remainder of the programs showed an emphasis upon three or more of the identified factors.

Four programs showed factor scores above the mean for Factor 1 (Functional Activities); three above the mean for Factor 11 (Content Determination); five above the mean for Factor 111 (Specialized-Affective Functions); three above the mean for Factor 1V (Instructional Organization); five above the mean for Factor V (Operational Base) and four above the mean for Factor V1 (Pupil Goals).

The common emphasis upon Factors 111 and V agrees with the generalizations made in the visual interpretation of the data. Factor 111, for example, related to the supportive role the programs adopt in the elementary school

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

and to the affective functions of the programs in terms of provision for individual differences and the development of safe work habits. Statements which the majority of programs saw as being most descriptive related to these functions.

Factor V is more difficult to relate to the visual interpretation of the data. The four statements used to relate this factor to program operation and desired outcomes were ranked by the majority of the programs in columns C, D, and E, indicating a neutral position with respect to these statements. This clustering of data, combined with relatively high factor loading scores on similar types of statements within the factor, especially statement thirty-one, could attribute to the evident emphasis.

Factors l and Vl each indicated four programs showing a factor loading above the mean. The general disposition of rankings for statements relative to these factors, while not satisfying the criterion set down for descriptive statements in the visual interpretation, do indicate a general agreement that the common elements present within the factors are receiving emphasis within the identified programs. Statements number twenty-six and forty, for example, both relate to the functional activities outlined as being descriptive of Factor l. Statements number twenty-one and thirty-two illustrate the emphasis placed upon pupil goals in Factor Vl. In a similar manner, other fact-

ors receiving emphasis within different programs can be visually related to statement rankings in Tables 1, 2, and 3.

In summation, the statistical analysis of the data revealed that individual programs were placing emphasis upon varying numbers of the identified factors. Project Loom and Kansas City, Missouri appeared to place the least emphasis upon identified factors while Nova Schools and Centennial School District placed emphasis upon the most identified factors.

It would appear that emphasis in the majority of programs is being placed upon the supportive role industrial arts adopts in the elementary school. Further, the statistical analysis points out the importance placed on traditional aspects such as development of safe work habits and the appreciation of a job well done. Instructional methods involving the development of acceptable attitudes, such as acting with autonomy and self direction in problem solving,were also stressed.

While not apparent in the visual interpretation of the data, the statistical analysis also reveals agreement upon the importance of activities involving orientation to the world of work and the use of a wide variety of materials and processes. Added emphasis was placed upon provision being made for pupils to explore, experiment and develop individuality through programs which accommodate for individual differences in ability and interest.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In Chapter I, it was pointed out that this investigation was directed at a description and comparison of selected contemporary programs in elementary school industrial arts. Four major objectives were established to guide the study: (1) To review the approaches, movements and programs in industrial arts at the elementary level in the United States of America as they are reflected in the literature related to the field, (2) to develop a conceptual framework from statements relating to objectives, content and teaching methods identified in the literature that could be used to analyze contemporary programs in the field, (3) to describe a number of selected contemporary programs and, (4) to analyze the selected programs with the developed conceptual framework.

Each of the preceding chapters provides supporting data and findings related to these objectives. These findings provide the bases for the conclusions and recommendations and observations set down in this Chapter. The statements listed in the section relating to conclusions are supported by the findings and are related to the specified objectives of the study. The recommendations suggest further uses for the findings together with implications for further study in the field under investigation. The observations

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

noted reveal opinions and findings which lack sufficient support from the data to be included as conclusions of the study, but were felt by the researcher to be pertinent to it.

Conclusions of the Study

Based on the review of the literature, the descriptive overviews of the selected contemporary programs, and the systematic comparison of these selected programs, numerous conclusions could be made. It is not the purpose of this section, however, to make a prolific listing of these. Instead, the following major conclusions have been identified which warrant the attention of persons involved in research and development aimed at the introduction of improved educational programs involving a study of technology and the world of work at the elementary school level.

(1) Elementary school industrial arts in the United States has been in a constant state of flux and re-orientation since its early inception. Since 1960, however, many changes and innovations have been implemented which have led to major modifications with wide implications to the field of study.

(2) There were identifiable curriculum elements in the field of elementary school industrial arts that could be incorporated into a conceptual

framework to systematically compare contemporary elementary school industrial arts programs.

(3) Individual directors associated with the selected programs under study showed general agreement on the majority of statements in the conceptual framework. This enabled the identification of a number of curriculum elements which could be classed as most or least descriptive of all programs. Although this agreement was evident, the structure of the programs varied greatly since individual programs tended to take different positions on key issues. The Technological Exploratorium K-6 director, for example, saw the study of the effects of technology on contemporary society as being most descriptive of the program. Bertie County Schools also placed emphasis upon this issue while the remainder of the program directors saw it as being much less descriptive. Similarly, Project Loom saw the objective relating to providing the student with knowledge about the world of work as being most descriptive of the program, while the remainder of the programs took a decided 'middle of the road' attitude about the issue. Consideration of the rankings of statements as shown in Tables 1, 2 and 3

serve to illustrate further examples of the divergent positions some programs took on similar issues.

(4) There was general agreement among the selected programs, as demonstrated by the identified directors, on the specified items in the conceptual framework. In general, these similarities may be listed randomly as follows:

(a) There was general agreement that provision should be made for the development of traditional aspects such as psychomotor skills and desirable, safe work habits. The acquisition of worthwhile work attitudes such as co-operation and appreciation of a job well done was also emphasized.

(b) Emphasis was placed upon programs playing a supportive role for other subjects in the elementary school. Content closely correlated with subject matter being taught in other areas of the curriculum, activities being co-ordinated with other subjects for enrichment of subject matter and increase of academic achievement through manipulative experiences involving tools, techniques and materials, were statements which showed general positive support.

(c) The programs emphasize the need for an industrial arts specialist or consultant who functions as an adviser, co-operating with the teacher in planning activities and developing a separate activity plan to suit the needs of each class.

(d) Little emphasis was placed upon a structured program of activities. Positive support received for a flexible schedule of activities, and negative support for both content classified under various instructional areas and for a structured content continuum, indicates the general agreement that programs are not tied to a fixed timetable or content structure.

(e) There was general agreement upon the importance of activities involving the world of work and the use of a variety of materials and processes.

(f) Emphasis was placed upon provision being made for pupils to explore, experiment and develop individuality through a program which accommodated for individual differences in ability and interest.

Recommendations

Based on the findings of this study, and the ensuing conclusions, the following recommendations arising from the findings were made, together with implications for further study.

Recommendations Arising From the Findings

(1) An organizational framework should be developed to assist in the implementation and field testing of curriculum proposals in elementary school industrial arts.

(2) A series of comparative or descriptive criteria should be formulated so that innovative programs can be more effectively evaluated prior to receiving unanimous support from those in the profession associated with this field of education.

(3) Studies should be made to determine the degree to which programs are fulfilling their stated objectives.

(4) Curriculum development in elementary school industrial arts should be emphasized at the teacher education level so that new, innovative and conventional programs can be compared. This would enable teachers and institutions to select the program or elements from various programs

which they could support and implement.

(5) Descriptive information concerning elementary school industrial arts programs should be automatically made available to all teacher educators, teachers and others interested in the field.

(6) A series of meetings should be held for directors associated with elementary school industrial arts programs to facilitate better understanding of the direction for each program. This could prevent duplication of effort, promote greater stability and lead towards the development of better program structure. Further, such meetings would help to provide an overall direction for the field.

Implications for Further Study

The implications for further study take the form of brief descriptions of related studies that could be undertaken in the field of elementary school industrial arts to supplement this investigation into curriculum elements.

(1) The statements in the conceptual framework should be ranked by classroom teachers involved in the implementation of each program. In this manner, a comparison could be made between the rankings of the program directors involved in this study with those of the classroom teachers

to determine the degree of commonality between theory and practice.

(2) The developed conceptual framework should be used on other elementary school industrial arts programs to determine similarities and differences in their basic structures and conclusions made as to whether the common elements identified in the programs under investigation are shared by other programs in the field.

(3) Evaluative studies by outside agencies or individuals should be undertaken to determine the success of implementing industrial arts programs in the elementary school. Such studies would serve to validate the stated outcomes for elementary school industrial arts, both with respect to individual programs and to the field in general.

Researcher's Observations

In conducting this study, several observations were made. Although these observations are not directly or conclusively supported by the findings, they were considered to be sufficient importance to the reader to warrant inclusion in this section.

(1) There was no indication of a general agreement about specific content for elementary school

industrial arts. A number of programs took positive positions about statements relating to specific content but, in the main, there appeared to be divergent thinking on the part of program directors as to the descriptiveness of these statements. This could be interpreted as meaning that individual programs are placing different interpretations on the unique content for the field. It is contended that more importance should be placed on identifying the unique contribution that this field makes to elementary education in the United States if it is to be accepted by educators as serving any function other than helping other subject fields teach their content more effectively.

(2) The programs receiving Federal funding present a structure that reveals particular areas of emphasis, but final description is difficult in that they are all in the development and implementation stages. This description could only be done with confidence after the programs had operated for some time without project funding. The researcher contends, however, that key issues relating to individual program objectives could well be de-emphasized at this time in favour of those elements identified as being common to all programs under study.

(3) While programs implemented as a result of Title III E.S.E.A. funding emphasize vocational or career education as key issues, there remains a hard core of conventional or traditional approaches to the subject. This is evidenced by the general agreement shown in all programs for issues relating to these conventional or traditional aspects. Indeed, the only marked difference between these programs and the more established programs in operation in Missouri, New York and California seems to be in terms of key issues. With the established programs indicating an increasing support for content relating to career education, it would appear that the overall purpose of all programs is similar, no matter what the field of study is termed, be it practical arts, industrial arts, vocational education, career education, world of work or teaching children about technology. The researcher contends that there should be consideration given to the allocation of Federal funds for elementary school industrial arts in terms of the overall purpose the respective programs serve rather than upon the significance of key issues within these programs.

(4) The similarities and differences between the programs suggest the need for further attempts

to develop a curriculum framework for the field. The variety of approaches, however, does suggest that there is a genuine searching for the direction and role of industrial arts in the total elementary school educational program. It is hoped that the ultimate direction and role for the field is determined by the real needs of the pupils and not by the availability of funding for specific educational programs.

SELECTED BIBLIOGRAPHY

A.C.E.S.I.A. Newsletter. Ohio's Technological Exploratorium Grades K-6. Warrensburg, Missouri: American Council for Elementary School Industrial Arts, Spring, 1971.

American Vocational Association. A Guide to Improving Instruction in Industrial Arts. Washington D.C.: Author, 1968 (Revision).

Arena, J. E., Perry, E. C., Rubin, D., & Hannan, E. The Learning Activity Package -- What it is and How to Use it. Fort Lauderdale, Florida: School Board of Broward County, no date.

Babcock, R. Elementary School Industrial Arts. Graduate Study in Industrial Arts. 10th. Yearbook of the American Council of Industrial Arts Teacher Education. Bloomington, Illinois: McKnight and McKnight, 1961, 33-41.

Backus, K. D. A Study of Perceived Objectives of Industrial Arts Among Superintendents, Industrial Arts Co-ordinators, and industrial Arts Teachers of Six Public School Districts of Texas. Unpublished doctoral dissertation, Colorado State College, 1968.

Baggs, A. C. Electricity in the Fourth Grade - Making a Buzzer. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 258-259.

Baillargeon, J. Industrial Arts for Elementary Grades - Program and Procedures for New York State. Man, Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970, 48-50.

Barrington, T. L., Heckman, G. H., Long, C. E., & Roscoe, J.E. Elementary School Industrial Arts Curriculum Guide. Windsor, North Carolina: Bertie County Board of Education, 1971.

Beauchamp, G. A. Curriculum Theory. Wilmette, Illinois: The Kagg Press, 1961.

Bertie County Board of Education. Elementary Industrial Arts Project. Application for First Continuation. Windsor, North Carolina: Author, 1969.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Bertie County Board of Education. Elementary School Industrial Arts Curriculum Guide for Grades K-7. Windsor, North Carolina: Author, 1971.

Bruner, J. S. The Process of Education. New York: Random House, 1960.

Centennial Schools, Warminster, Pennsylvania. Progress Report No.1 on the Planning and Construction of the Everett A. McDonald Elementary School. Warminster, Pennsylvania: Author, March 1967.

Centennial Schools, Warminster, Pennsylvania. Progress Report No. 5 on the Planning and Construction of the Everett A. McDonald Elementary School. Warminster, Pennsylvania: Author, August 1970.

Cochran, L. H. A Comparison of Selected Contemporary Programs in Industrial Education. Unpublished doctoral dissertation, Wayne State University, 1968.

Cochran, L. H. Innovative Programs in Industrial Education. Bloomington, Illinois: McKnight and McKnight, 1970.

Deck, W. L. Crafts in the Elementary School. Where the Action Is. Addresses and Procedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 249-251.

DeLapp, R. Integrated Handwork. Industrial Arts - Kindergarten Through Grade Six, Rochester, New York. Excerpts from a description of the Integrated Handwork Program presented by Robert DeLapp at a combined meeting of the Three Arts Department, School No. 3, 59 Tremont Street, Rochester, New York: Division of Instruction, Rochester City School District, 1968.

Dewey, J. The School and Society. (2nd. ed.) Chicago: University of Chicago Press, 1915.

Dispensa, J. Effecting Change Through the Elementary Classroom Teacher: Classroom Phase. New Concepts in Industrial Arts. Addresses and Proceedings of the 30th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1968, 260-261.

Dresser, V. W. Construction in the Elementary School Curriculum. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C: American industrial Arts Association, 1969, 216-219.

Dreves, F. J. Technology For Children Project. Proceedings of the 17th. Annual Convention of the Industrial Arts Association of Pennsylvania, November, 1969.

Dreves, F. J. Implementation of Technology for Children Curriculum in New Jersey Elementary Schools. Trenton: Division of Vocational Education, New Jersey State Department of Education, March, 1970.

Dreves, F. J. Emphasis on the Child. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 116-118.

Dreves, F. J. Technology for Children - Rationale. Trenton: Bureau of Occupational Research Development, Division of Vocational Education, New Jersey State Department of Education, no date.

Duncan, G. S. Toward a Better Understanding of Industrial Arts in the Elementary Schools. Industrial Arts and Vocational Education, December, 1963, 18-19.

Earl, A. W. Elementary School Industrial Technology Program. Industrial Arts and Vocational Education, November, 1967, 32-34.

Emans, R. A Proposed Conceptual Framework for Curriculum Development. The Journal of Educational Research, March, 1966, 327-329.

Face, W. L., Flug, E. R. F., & Swanson, R. S. A Conceptual Approach to American Industry. Approaches and Procedures in Industrial Arts. 14th. Yearbook of the American Council of Industrial Arts Teacher Education. Bloomington, Illinois: McKnight and McKnight, 1965.

Gerbracht, C. J. Industrial Arts in Elementary Education. Industrial Arts and Vocational Education, January, 1956, 1-2.

Gerbracht, C. & Gilbert, H. Industrial Arts for Grades K-6. Industrial Arts and Vocational Education, September, 1958, 199-201.

Gilbert, H. G. Introducing Elementary School Children to Industrial Processes. Developing Human Potential Through Industrial Arts. Addresses and Proceedings of the 27th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1965, 226-227.

Gilbert, H. G. Children Study American Industry. Dubuque, Iowa: Wm. C. Brown, 1966.

Giovannoni, J. J. Industrial Arts in Kindergarten Through Grade 6. New Directions For Industrial Arts. Addresses and Proceedings of the 26th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1964, 85.

Good, C. V.(Ed.) Dictionary of Education. New York: McGraw Hill, 1959.

Goodlad, J. I. The School In Review. School Review, December, 1958, 395-397.

Goodlad, J. I. The Changing School Curriculum. New York: Fund for the Advancement of Education, 1966.

Greene, B. I. A Point of View. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 108-109.

Hackett,D. F. Introducing Elementary Children to Industrial Processes. Developing Human Potential Through Industrial Arts. Addresses and Proceedings of the 27th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1965.

Hackett,D. F. Industrial Element for the Elementary School. School Shop, March, 1966, 58-62.

Harman, H. H. Modern Factor Analysis. (2nd ed.) Chicago: The University of Chicago Press, 1968.

Harnack, R. B. Implementation of the Technology for Children Project. Trenton: Division of Vocational Education, New Jersey State Department of Education, 1970.

Hauenstein, A. D. A Study of the Man Made World for Elementary Schools. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 139-142.

Heasley, N. A Technological Exploratorium K-6. Resume of the Project. Hudson, Ohio: Technological Exploratorium Project, no date.

Heckman, G. H. & Barrington, T. L. Action in Elementary Classrooms. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970.

Herrick, V. E. & Tyler, R. W. (Eds.) Towards Improved Curriculum Theory. Chicago: University of Chicago Press, 1950.

Hoffman, D. C. Industrial Arts at the McDonald Comprehensive Elementary School. Man, Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970.

Hoffman, D. C. To Provide Richness of Experience. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 113-115.

Hoots, W. R. The Development of a Course of Study for Industrial Arts Education at the Elementary School Level. Washington D.C.: United States Office of Education (DHEW), 1968. ERIC ED 024 822.

Hoots, W. R. In-service Industrial Arts Education for Elementary Teachers. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 190-192.

Hoots, W. R. In a Changing Society. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 106-107.

Householder, D. J. & Suess, A. R. Review and Synthesis of Research in Industrial Arts Education. (2nd. ed.) Columbus, Ohio: The Center for Research and Leadership Development in Vocational and Technical Education, Ohio State University, October, 1969.

Hudson Public Schools. Schools Notes. Hudson,Ohio: Author February, 1971.

Hudson Public Schools. School Notes. Hudson, Ohio: Author November, 1971.

Hunt, E. E. The Role of Industrial Arts in the Development of the Elementary School Child. New Directions in Industrial Arts. Addresses and Proceedings of the 26th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Association, 1964, 139-142.

Hunt, E. E. The Institute of Technology for Children. Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1967, 224-229.

Hunt, E. E. Technology for Change in Elementary Schools - Strategy for Change. New Concepts in Industrial Arts. Addresses and Proceedings of the 30th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1968, 253-256.

Hunt, E. E. & Stunard, A. E. Design for Learning - 1967 Summer Institute of Technology for Children. Trenton: New Jersey Department of Education, 1968.

Industrial Arts Department, City School District, Rochester. Integrated Handwork Activity Units Grades K-7: Author, no date.

Ivey, L. T. A Study of Elementary School Industrial Arts. Greenville, North Carolina: Department of Industrial and Technical Education, East Carolina University, 1968.

Ivey, L. T. Implementation Committee Report. Man, Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970, 54-57.

Ivey, L. T. Technological Innovation in Elementary Industrial Arts. School Shop, April, 1970(a), 104-108.

Jackman, D. A. Industriology for the Elementary School. Man, Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970, 325-326.

Jeffrey, T. J. et. al. A Basis for Elementary School Industrial Arts (Committee Report). Man, Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970, 51-52.

Johnson, S. B. Developing a National Curriculum in the Technologies for the Elementary Grades. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 111-112.

Kansas City, Missouri, Public Schools. Industrial Arts Enrichment Experiences in the Elementary School, Grades Five and Six. Kansas City, Missouri: Author, January, 1968.

Kazarian, E. N. Elementary Industrial Arts: Primer to Understanding. Industrial Arts and Vocational Education, December, 1963, 14-15.

Kerlinger, F. N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, 1967.

Killen, O. B. Elementary Industrial Arts Teacher Education in Washington. Developing Human Potential Through Industrial Arts. Addresses and Proceedings of the 27th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1965, 223-225.

King, A. R. & Brownwell, J. A. The Curriculum and the Disciplines of Knowledge: A Theory of Curriculum Practice. New York: John Wiley and Sons, 1966.

Kurland, B. Its a Do-It-Yourself World. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 124-125.

La Belle, K. Nova Lower Schools. Fort Lauderdale, Florida: School Board of Broward County, 1970.

Los Angeles City Schools, Division of Instructional Services. Industrial Arts Instructional Guide. Los Angeles, California: Author, 1963 revision.

Lownsbery, N. E. Kaleidoscope - Where Do We Go From Here? Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1967, 281-282.

McMullan, M. Unified Arts in an Elementary School. School Executive, September, 1959, 62-63.

McWhinnie, H. J. The Place of Industrial Arts in the Grades. Industrial Arts and Vocational Education, June, 1962, 18-19.

Metropolitan Area Industrial Arts Consultants. News From Occupational Versatility. Seattle, Washington: Author, March, 1970.

Metropolitan Area Industrial Arts Consultants. News From Occupational Versatility. Seattle, Washington: Author, Fall, 1970.

Metropolitan Area Industrial Arts Consultants. News From Occupational Versatility. Seattle, Washington: Author, Fall, 1971.

Metropolitan Area Industrial Arts Consultants. Project Occupational Versatility. The Role of the Student in the Industrial Arts Environment. Seattle, Washington: Author, no date.

Meyer, D. R. Enrichment Through Industrial Arts for Grades Five and Six. Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1967, 56-57.

Miller, W. R. The Role of Industrial Arts in the Elementary School. Industrial Arts Teacher, September-October, 1962, 20-21.

Miller, W. R. & Boyd, G. Teaching Elementary Industrial Arts. South Holland, Illinois: Goodhart-Wilcox,1970

Neagley, R. L. & Evans, N. D. Handbook of Effective Curriculum Development. Englewood Cliffs, New Jersey: Prentice-Hall, 1967.

Nothdurft, D. D. American Council for Elementary School Industrial Arts. Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1967, 280-281.

Nunnally, J. C. Introduction to Psychological Measurement. New York: McGraw-Hill, 1970.

Olsen, D. W. Industrial Arts and Technology. Englewood Cliffs, New Jersey: Prentice-Hall, 1963.

Osborn, C. A. Elementary School Industrial Arts Education at Eastern Michigan University. Developing Human Potential Through Industrial Arts. Addresses and Proceedings of the 27th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1965, 217-218.

Pace, V. R. A Student Participation Program - Industrial Arts for the Elementary Grades. Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C: American Industrial Arts Association, 1967, 282-283.

Project Loom, Florida State University. About the Realia Kit. Tallahassee, Florida: Author, December, 1971.

Quinn, H. Industrial Arts in the Elementary School - First Grade Results at the Second Grade Level. School Shop, March, 1971, 33-35.

Raffaelli, E. J. Implementation in Reading, Pennsylvania. Man, Society and Technology. Journal of Industrial Arts Education, January, 1971, 122-123.

Rosser, A. J. & Howard, A. B. Innovations in the Florida Schools...Elementary School Industrial Arts. Man Society and Technology. Addresses and Proceedings of the 32nd. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1970, 38-39.

School Board of Broward County. The Nova Plan Philosophy. Fort Lauderdale, Florida: Author, January, 1971.

School Board of Broward County. Elementary Schools Practical Arts Objectives. Fort Lauderdale, Florida: Author, no date.

Schwab, J. J. The Concept of the Structure of a Discipline. Educational Record, July, 1962.

Scobey, M. M. Introducing Children to Industrial Arts. The Journal of Industrial Arts Education, March-April, 1966, 24-.

Scobey, M. M. Teaching Children About Technology. Bloomington, Illinois: McKnight & McKnight, 1968.

Simonson, V. Technology for Children Project. Instructor, August-September, 1970, 76-77.

Smith, W. G. The Technical Science Program at the Nova Schools. Fort Lauderdale, Florida: School Board of Broward County, 1970.

Spence, W. P. Recent Research In Industrial Arts Education. Industrial Arts and Vocational Education, September, 1968, 28-.

Sredl H. J. Industrial Arts in the 1920's. Journal of Industrial Arts Education, May-June, 1966, 33-36.

State of Florida, Department of Education, Division of Vocational, Technical and Adult Education. Planning Grant to Determine Status of Vocational Education in Elementary Schools in Florida, Final Report, Project No. VTAD Bl-5030 (FSU 81-951). Tallahassee, Florida: Author, 1970.

State of Florida, Department of Education, Division of Vocational, Technical and Adult Education. Industrial Arts Elementary Curriculum Project, Interim Report, Project Nos. VTAD Cl-0002, Cl-0048. Tallahassee, Florida: Author, 1971.

Steeb, R. V. Supervising the Action in the Elementary School. Where the Action Is. Addresses and proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 245-247.

Stunard, A. E. Effecting Change Through the Elementary Classroom Teacher: Institute Phase. New Concepts in Industrial Arts. Addresses and Proceedings of the 30th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1968, 257-260.

Summit County Board of Education. "Sonar". Akron, Ohio: Author, December, 1970.

Taba, H. Curriculum Development - Theory and Practice. New York: Harcourt, Brace and World, 1962.

Technological Exploratorium Project. Goals and Objectives. Hudson, Ohio: Author, no date.

Thieme, E. & Pugh, W. Organization and Teaching of the Elementary Industrial Arts Program. New Directions in Industrial Arts. Addresses and Proceedings of the 26th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1964, 143-144.

Thrower, R. G. Elementary Industrial Arts. Journal of Industrial Arts Teacher Education, 1965, 33-35.

Thrower, R. G. Implementation of Technology in the Elementary School Program. Industrial Arts and Technology. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1967, 195-199.

Towers, E. R., Lux, D. G., & Ray, W. E. A Rationale and Structure for Industrial Arts Subject Matter. Columbus, Ohio: Ohio State University and University of Illinois, November, 1966.

Tyler, R. W. The curriculum - Then and Now. The Elementary School Journal, April, 1957, 363-.

Van Deusen, R. The Role of Industrial Arts in the Elementary School Curriculum. New Directions for Industrial Arts. Addresses and Proceedings of the 26th. Annual Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1964, 135-138.

Weber, E. M. Industrial Arts in the Elementary School. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 212-214.

Wilber, G. O. & Pendered, N. C. Industrial Arts in General Education. Scranton, Pennsylvania: International Textbook, 1967.

Williams, W. R. Elementary School Industrial Arts. American Vocational Journal, December, 1964, 21-23.

Williams, W. R. Studying Industry in the Grades. Journal of Industrial Arts Education, January-February, 1965 54-56.

Wonacott, W. A., Giovannoni, J., Hedrick, F., & Boyd, G. T. Elementary School Industrial Arts. Education Digest, March, 1964, 50-52.

Wonacott, W. A. Elementary School Industrial Arts: A Multi-Media, Multi-screen Presentation. Industrial Arts and Technology - Past, Present and Future. Addresses and Proceedings of the 29th. Annual American Industrial Arts Association Convention. Washington D.C: American Industrial Arts Association, 1967, 120-121.

Wonacott, W. A. Introducing Children to the Concepts of Mass Production. Where the Action Is. Addresses and Proceedings of the 31st. Annual American Industrial Arts Association Convention. Washington D.C.: American Industrial Arts Association, 1969, 214-216.

Woodford, R. A. Classrooms: Tooling Up. New Jersey Business, February, 1971, 20-23.

Zimmerman, T. C. Teaching Activities in Elementary I-A. Industrial Arts and Vocational Education, December, 1963, 16-17.

Zullinger, J. Community Leaders Look at Industrial Education. American Vocational Journal, April, 1968, 58-59.

APPENDIX A

Ten Identified Contemporary Programs

The contemporary programs and participating leaders listed in this appendix represent those selected for comparison from those identified as being most significant by members of the American Council for Elementary School Industrial Arts.

Program	Director
1) Elementary School Industrial Arts Bertie County Schools Windsor, North Carolina.	Mr. Larry T. Ivey, Director Title 111, E.S.E.A. Project P.O. Box 10 Bertie County Schools Windsor, North Carolina.
2) Elementary School Industrial Arts Centennial School District Warminister, Pennsylvania.	Mr. Donald Hoffman McDonald Elementary School Centennial School District Warminister, Pennsylvania.
3) Integrated Handwork City School District Rochester, New York.	Dr. Eberhard Thieme Acting Supervising Director of Instruction City School District of Rochester. 13 Fitzhugh Street, South Rochester, New York.
4) Industrial Arts Enrichment in the Elementary School Kansas City Public Schools Kansas City, Missouri.	Mr. T. Gardner Boyd, Director, Industrial Arts Kansas City Public Schools Board of Education Building 1211 McGee Street Kansas City,Missouri.
5) Elementary Industrial Arts Los Angeles Unified School District, Los Angeles, California.	Mr. Wayne Wonacott Supervisor, Elementary Industrial Arts Career Education Service Unit Division of Career Continuing Education Los Angeles City Unified School District 632 N. Madison Avenue Los Angeles, California.
6) Practical Arts Activities Nova Elementary Schools Fort Lauderdale Florida.	Mr. Robert G. Schaefer Supervisor of Technical Science 3600 S.W. College Avenue Fort Lauderdale, Florida.
7) Project Loom Florida State University Tallahassee, Florida.	Dr. James R. Heggen and Mr. John J. Geil, Directors Project Loom Industrial Arts Department Florida State University Tallahassee, Florida.

8)	Project Occupational Versatility Highline Public Schools Seattle, Washington.	Mr. John Lavender, Director Project Occupational Versatility 11401 - 10th. Avenue, Sth. Seattle, Washington.
9)	Technological Exploratorium K-6 Hudson, Ohio.	Mrs Norma Heasley, Director Technological Exploratorium K-6 Title 111 E.S.E.A. Project 76 North Hayden Parkway Hudson, Ohio.
10)	Technology For Children State Department of Education Trenton, New Jersey.	Dr. Fred J. Dreves, Director Technology for Children Project The Division of Vocational Education State Department of Education 225 West State Street Trenton, New Jersey.

APPENDIX B

Letter Requesting Listings of Significant Contemporary Programs

This appendix includes the initial request to members of the American Council of Elementary School Industrial Arts for a list of most significant contemporary programs.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION

THE UNIVERSITY OF ALBERTA
EDMONTON 7, ALBERTA, CANADA

I am a graduate student at the University of Alberta and have undertaken a thesis that will attempt to anlayze some of the contemporary programs in elementary school industrial arts. Under the title of "A Description and Comparison of Selected Contemporary Elementary School Industrial Arts Programs in the United States of America", I hope to describe a number of programs, and, from these programs, identifv common elements through the application of a developed instrument.

Dr. William Downs, the treasurer of the American Council for Elementary School Industrial Arts, has suggested that I contact you in hopes that you may nominate what you consider to be the ten most significant elementary school industrial arts programs in operation in the United States at the present time. By 'significant', I mean those programs which, to you, are providing the most worthwhile contributions to this area of education. The size of the program and its length of standing would, of course, be incidental. If possible, I would like you to make your selection according to the following criteria.

1. That the program has been at the experimental and testing stage within an elementary school or schools for at least a school year.

2. That descriptive material concerning the program is available in the form of articles or printed releases.

I realize that this is somewhat of an imposition, but I fail to see any other way in which I can ensure that the programs selected for description are, in fact, those which most warrant description and comparison. Any information you can supply will be deeply appreciated. I hope that, through your co-operation and assistance, I will be able to make a meaningful contribution to the field.

If you are prepared to make this selection for me, I would appreciate any information you might have concerning the names and addresses of directors or supervisors of the programs you have nominated.

Yours in anticipation,

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

APPENDIX C

Initial Letter Requesting Descriptive Materials From The Identified Programs

This appendix includes the initial letter requesting information which was sent to the leaders associated with the ten identified programs.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION

THE UNIVERSITY OF ALBERTA
EDMONTON 7, ALBERTA, CANADA

____
____
____
____

____

Within the Department of Industrial and Vocational Education, I am undertaking a study that will attempt to describe and compare some of the contemporary programs in elementary school industrial arts within the United States of America. Under the title of "A Description and Comparison of Selected Contemporary Elementary School Industrial Arts Programs in the United States of America", I hope to review a number of significant programs and make a comparison of their content by means of a developed instrument.

Since you are associated with a contemporary program, namely, ______ ______________________, I should like your co-operation in initially making a description of your program. I would be most appreciative if you would provide me with (1) a description of your program, (2) a copy of any releases you have developed and (3) a listing of published articles focusing on the program. I realize that this is a sizeable request, but the more information I have, the more realistic view I can project of your contribution to the field.

At a later date I will send you an instrument containing a number of statements which, when ranked, will constitute your participation in the comparison of the selected programs.

Upon completion of the description, I will send you a copy for possible correction and editorial suggestions.

Sincerely,

Geoffrey T. Nicholls,
Principal Investigator.

APPENDIX D

(a) Cover Letter With the Conceptual Framework to the Directors of the Ten Programs.

(b) Instruction Sheet and Card Samples for Ranking Items in the Conceptual Framework.

The letter in this appendix was sent to the directors representing the ten selected programs and explained their role in the study.

The instruction sheet in this appendix provided the directions for the program directors for ranking the fifty-two statement cards in the conceptual framework.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION

QUAECUMQUE VERA

THE UNIVERSITY OF ALBERTA
EDMONTON 7, ALBERTA, CANADA

____
____
____
____

____

Thank you for the information you have forwarded about the ________ ______________ program. I have taken the liberty of assuming that you have agreed to further participate in my study "A Description and Comparison of Selected Contemporary Elementary School Industrial Arts Programs in the United States of America." The description of the programs is almost complete and I am beginning the comparison of the selected programs. Within the next few weeks I will be forwarding the description I have made of your program for you to make any editorial comments you feel are necessary. I will enclose a list of programs under study at this time.

In the meantime, enclosed is an instrument containing fifty-two statements which, when ranked, will constitute your participation in the comparison of the selected programs. These statement cards have been revised, refined and tested on a pilot basis, so I hope they will be clear to you.

Hopefully, the instrument has been planned so that it will take a minimal amount of your time. Remember that this is a comparative rating method and not an absolute one. Do not be concerned, therefore, with ranking cards selected within each of the seven categories A through G.

Thank you again for co-operating,

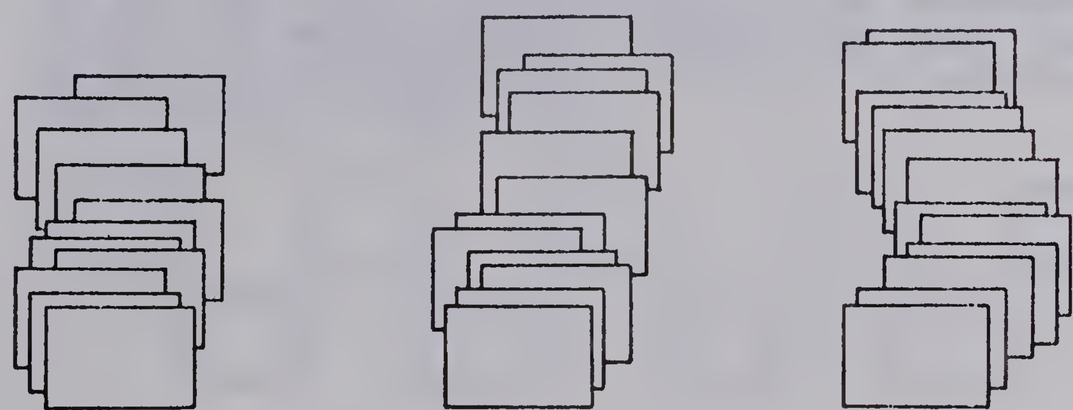
Sincerely,

Geoffrey T. Nicholls,
Principal Investigator.

INSTRUCTION SHEET.

Directions: This instrument is composed of fifty-two selected statements relating to objectives, content and teaching methods in elementary school industrial arts. The task is to classify these statement cards in the order which best describes your program.

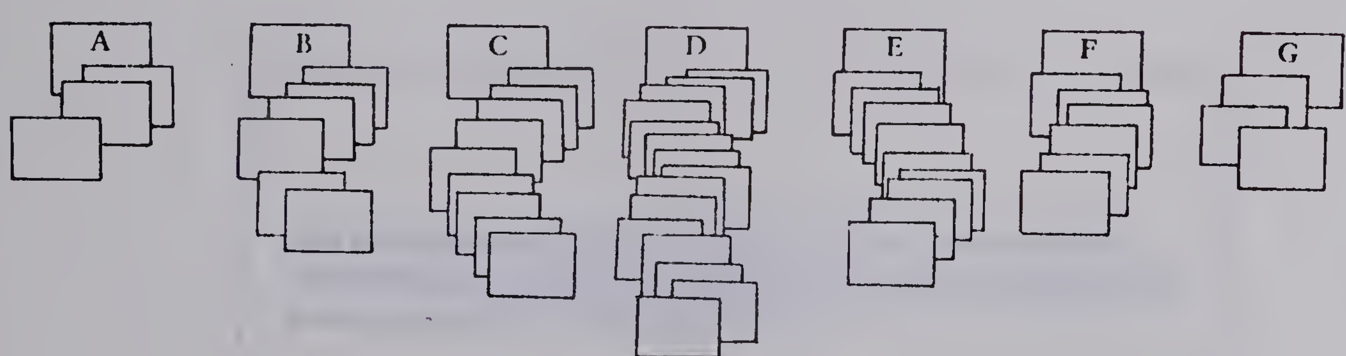
Step 1. Sort the white statement cards into three categories (as illustrated below). There are no right or wrong answers. A quick snap decision that represents your opinion is sufficient at this point.



Most Descriptive | Undecided | Least Descriptive

Step 2. Place the seven green cards (A through G) in alphabetical order before you. From the first stack (Most Descriptive) select the three statement cards that you consider to best describe your program and place them on green card A in any order. Continue this process (working from the most descriptive stack through the undecided stack to the least descriptive stack) for cards B through G by placing the indicated number in each stack until all fifty-two cards have been used. You will observe that the last three cards will be placed on green card G.

(3) (6) (9) (16) (9) (6) (3)



Step 3. When all statements have been placed in appropriate stacks (A through G), the identification number on the bottom of each statement card can then be recorded on the green sorting card for that stack. DO NOT BE CONCERNED WITH RANKING THESE CARD STATEMENTS.

Step 4. Place the seven green cards in the enclosed self-addressed envelope and return them to Geoffrey T. Nicholls, Department of Industrial and Vocational Education, University of Alberta, Edmonton, Alberta, CANADA. The fifty-two statement cards may be retained for future reference.

C

SELECT THE NEXT NINE STATEMENTS YOU CONSIDER TO BE THE MOST SIGNIFICANT TO YOUR PROGRAM. PLACE THE IDENTIFICATION NUMBER FOR EACH CARD IN ONE OF THE SQUARES. *DO NOT BE CONCERNED WITH RANKING THESE CARDS.*

THE PROGRAM PROMOTES OCCUPATIONAL AWARENESS BY HELPING THE PUPIL TO IDENTIFY AND DIFFERENTIATE A WIDE VARIETY OF OCCUPATIONS.

23

APPENDIX E

A Listing of the Items Included in the Conceptual Framework

This appendix includes the fifty-two statements in the conceptual framework that were ranked by the selected leaders.

APPENDIX E

A LISTING OF THE ITEMS INCLUDED IN THE CONCEPTUAL FRAMEWORK

1) Content is classified under various instructional areas such as mass production, model making, building replicas of inventions, building construction activities, bookbinding, printing etc.
2) The program provides for a purpose and goals continuum for industrial arts from elementary school through secondary school.
3) The program emphasises activities which provide opportunities for children to develop psychomotor skills.
4) The program is offered as a structured content continuum that follows successively throughout the elementary school years.
5) The program is concerned with the historical development of technology and industry and their influences on society and culture.
6) Content is primarily concerned with informational topics rather than manipulative type activities.
7) The content is determined by the teacher alone.
8) Activities are usually limited to short blocks of time.
9) Instruction places emphasis upon the excellence of the final product and the skills and procedures involved in its construction.
10) The content consists of selected industrial concepts and their applied technical experiments.
11) The program places emphasis upon using community resources (industrial and commercial visits, talks and demonstrations by members of the community).
12) The program emphasises experience with a variety of current industrial methods, including line production technique, use of jigs and fixtures and the interchangeability of parts.
13) The primary responsibility for developing activities and implementing them into the curriculum lies with the classroom teacher and not the industrial arts consultant.
14) The content is closely correlated with subject matter in other areas of the elementary school curriculum.
15) Role playing is advocated as a method to more successfully achieve mastery of the program.

16) The content is determined through a team approach inv-
olving the teacher and an industrial arts specialist.

17) No attempt is made to allocate certain content material
to any particular grade level of the elementary school.

18) Films and other audio-visual materials form a major
part of the instructional program.

19) Pupils are encouraged to progress at their own rate at
a number of work stations.

20) Activities in the program are directed toward the dev-
elopment of recreational interests and hobbies.

21) Diversity in instructional approach is built into the
program to accommodate individual differences in abil-
ity and interest.

22) In teaching industrial arts subject matter, emphasis
is not placed on the constructional activity but on the
types of learning which occur as a result of it.

23) The program promotes occupational awareness by helping
the pupil to identify and differentiate a wide variety
of occupations.

24) The program provides the student with knowledge about
the world of work, its requirements, demands, rewards
and opportunities.

25) The program provides opportunities for the pupil to
develop self concepts in terms of occupations through
involvement in simulated job situations.

26) The program is designed to encourage pupils to act with
autonomy and self direction in solving problems and
making judgements.

27) The content is primarily concerned with developing
appropriate work habits, and the proper attitude towa-
rd the world of work.

28) The program is designed to increase academic achievem-
ent through manipulative experiences involving tools,
techniques and materials.

29) The development of desirable, safe work habits is int-
eg egrated into the entire program.

30) Major activities are managed and directed by pupils
with the teacher remaining in the background.

31) Content places a major emphasis upon concrete experie-
nces dealing with manipulation and explanation of mat-
erials, tools and processes.

32) The program emphasises the opportunity for pupils to
explore and experiment with aspects of their experien-
ces in other subjects in the curriculum.

33) Instruction is oriented towards problem solving experiences.

34) The program is based on selected practical experiences that provide for an understanding of industry and its workers.

35) The program is taught by an activity centred, manipulative method.

36) The content is determined by an industrial arts specialist in terms of objectives he has made for an overall industrial arts program for the school or district.

37) Emphasis is placed upon group activities directed towards a common goal rather than individuals working towards separate goals.

38) The content is derived from activities that support work done in the other subjects of the elementary school.

39) Emphasis is placed upon children acquiring worthwhile work attitudes, such as co-operation and appreciation of a job well done.

40) The program aims at encouraging self expression and creativity through and in large numbers of materials and products.

41) The program is not presented on a rigorous daily or weekly schedule but is kept flexible so that the activities can meet the needs of the school and the individual class.

42) Emphasis is placed upon pupils working and planning together as a team.

43) The program is designed to promote consumer knowledge by developing the ability to select, purchase and use wisely the products of industry.

44) An industrial arts consultant directs the activities, the teacher co-operating in planning the work and assisting in carrying out the activities.

45) The program focuses upon the study of the effects of technology on contemporary society.

46) The program provides for the study of industry in its totality, including concepts involving labour, capital and distribution.

47) Consideration is focused on the development of an appreciation of good design and craftsmanship.

48) Activities in the program are focused upon the correct and skilful use of basic hand tools to process a variety of materials.

49) Instructional content focuses upon a single theme for each grade.

50) The content places a major emphasis upon the use of a diversity of materials and allied processes.

51) Activities included in the program are jointly planned by the pupil and the teacher.

52) Activities are co-ordinated with other subjects for enrichment of subject matter.

APPENDIX F

Correspondence Received

This appendix includes copies of correspondence received and referred to in the study.

SAN FRANCISCO STATE COLLEGE

1600 HOLLOWAY AVENUE · SAN FRANCISCO, CALIFORNIA 94132

13 June 1971

Geoffrey T. Nichells
Dept of Industrial and Vocational Education
The University of Alberta
Edmonton, Alberta

Dear Mr. Nicholls,

Your letter of 1 June addressed to San Francisco State College finally reached me here where I am spending most of the summer.

Your thesis of comparing contemporary programs in elementary school industrial arts sounds most interesting. I should be happy to send you my ranked selections of existing programs, but I cannot do it now. All my files are at home, in Millbrae, California, and I surely cannot trust my memory for the details you require. Therefore if you still wish me to list some projects for you, I can do it about July 15th, when I will return home for a few days before I take off again to another part of the world.

You are aware, I am sure, of the trend that seems to be a reorientation of elementary school industrial arts. Some of the first projects focused on technology, but recently the new programs focus on occupational education, or how to teach young children about the world of work. I hope that your analysis will bring this out clearly. The reason seems to be the source of funds--a truly major influence on trends in education these days.

If you wish me to give my suggestions at the late date of 15 July, please let me know, and address me until then at the address given below.

Sincerely,

Mary-Margaret Scobey

Mary-Margaret Scobey
Professor of Education

Summer address until 15 July:

2210 West 28th Avenue
Eugene, Oregon 97405

Career Development for Children Project

November 11, 1971

Mr. Geoffrey T. Nicholls
Department of Industrial and
Vocational Education
The University of Alberta
Edmonton 7, Alberta, Canada

Dear Mr. Nicholls:

I regret that you have mistakenly inferred that our Career Development for Children Project is in any way related to industrial art. I prefer not to have a description of our project in any publication which gives the impression that it is elementary industrial arts.

Sincerely,

Larry J. Bailey

Larry J. Bailey, Ed.D.
Principal Investigator

LJB:mer

partment of Occupational Education / Southern Illinois University / Carbondale, Illinois 62901 / Phone 618 536-2381

Los Angeles City School Districts

ADMINISTRATIVE OFFICES: 450 North Grand Avenue, Los Angeles, California 90012
Telephone: 625-8921 MAILING ADDRESS: Box 3307, Los Angeles, California 90054

JACK P. CROWTHER
Superintendent of Schools

ROBERT J. PURDY
Associate Superintendent
Division of Elementary Education

September 29, 1971

Mr. Geoffrey T. Nicholls
Principal Investigator
Dept. of Industrial and Vocational Education
University of Alberta
Edmonton 7, Alberta, Canada

Dear Mr. Nicholls:

I will be pleased to do what I can to assist you with your study of elementary industrial arts as it exists today throughout the U.S.A. It will take a little time, but I believe what you are doing can help to further the program in both of our countries.

I am sending you our instructional guide that all of our teachers receive. It gives our point of view, the course of instruction, basic tools and suggestive projects for various activities. It is not complete or up-to-date with some of our work and I will attempt to fill in the missing areas.

In the Los Angeles City Unified School District we have 436 elementary schools of grades K-6. There are no special industrial arts teachers so our program is carried on by the regular classroom teacher. Out of our 13,000 elementary teachers, I can only guess as to how many carry on industrial arts activities each year. Probably about five to ten percent of our teachers participate in some project during the year spending from five to ten class hours in a short block of time.

The following outline may help to structure our program:

LEADERSHIP:

W. A. Wonacott, Elementary Industrial Arts Supervisor
Career Education Services Unit
Division of Career and Continuing Education

RESPONSIBILITY:

K - 6

INDUSTRIAL ARTS FACILITIES:

Office and Workshop
(a) Preparation of demonstration and instructional materials
(b) Weekly teacher workshops (informal in-service training)

RELATIONSHIP TO SCHOOLS:

(a) On call (no regular schedule of visits)
(b) Open-door privileges (experimental projects, etc.)

SERVICES TO SCHOOLS:

(a) Administrator and teacher advisory conferences
(b) Faculty meetings
(c) Classroom demonstrations (the single most valuable service to the teacher)
(d) School workshops for teachers (hands on)
(e) Directed experimental projects (develop new ideas)

INSTRUCTIONAL PROGRAM:

Industrial arts activities are correlated with the following areas:
(a) History, geography, science, language arts, Mathematics, artc, etc.
(b) World of work, technology, occupational orientation, etc.
(c) Activities of personal interest and self-discovery.

STANDARD EQUIPMENT IN SCHOOL:

(a) One or more portable tool carts with hand tools (Enough tools for a class of about 35 children)
(b) Sawhorses (Ten sawhorses for each tool cart)

GENERAL RESPONSIBILITIES OF THE INDUSTRIAL ARTS SUPERVISOR:

(a) Liaison with the 12 area superintendents.
(b) Liaison with the leadership of other subject fields.
(c) Liaison with the business division on matters of supplies and equipment.
(d) Preparation of instructional materials and films.

If this outline is too sketchy, please ask specific questions and I'll be glad to go into more detail. Our instructional guide does not show any projects in the world of work, occupational orientation, leather work, etc. We will have something in the future.

If you would like to visually see a little of our work, write to Dr. Edward Kabakjian, American Industrial Arts Association, 1201 Sixteenth Street, N.W., Washington, D.C., 20036 and borrow three films from the Media Library titled:

"How to Start Construction in the Elementary Classroom."

"How to Construct Miniature Scenery."

"How to Convert the Elementary Classroom into an Industrial Arts Laboratory."

These films would be useful to you in your own teacher training program and they can be purchased for a nominal sum. I would be interested in knowing what sort of training program you have for elementary school teachers, and what your plans are for the future.

Sincerely,

Wayne A. Wonacott

Wayne A. Wonacott
Elementary Industrial Arts Supervisor
Career Education Services Unit
632 N. Madison Ave.
Los Angeles, California 90004

WAW/mw

State of New Jersey

DEPARTMENT OF EDUCATION

225 WEST STATE STREET

P O BOX 2019

TRENTON, NEW JERSEY 08625

January 19, 1972

Mr. Geoffrey T. Nicholls
Special Lecturer
Department of Industrial and
Vocational Education
Faculty of Education
The University of Alberta
Edmonton 7, Alberta, Canada

Dear Mr. Nicholls:

I am sorry that I am not able to give you everything you want in the form you wanted, but I will supply you with the raw data.

First, all of the description of T4C. We have made some great strides in moving T4C away from a single classroom idea into a more functional systems approach which will provide for the rapid growth necessary. We do this by recommending a total systems commitment which we call "SYSCO." It is our intent to have each district delineate the commitment and follow specific steps toward this end. We affect this transition and achieve the objective by cooperating with a local administrator (generally the principal of the elementary school - we call him the T4C "supervisor"). He establishes and operates three teams in his school and works to spread "SYSCO" through the entire school district. These teams and their functions are as follows:

1. The Administration Team - consists of those administrative representatives necessary for a total commitment. At the school district level this includes the superintendent, board of education, pupil personnel services, personnel and teachers. At the individual school level, representation is as comprehensive as possible with the team working to achieve a total district commitment. This team is concerned with the overall management of T4C and seeks to expand it in both quantity and quality to benefit each individual student. In the interests of accountability, this team controls and reports the costs and evaluates the effectiveness of T4C. It is responsible for the direction of T4C and develops one and five-year plans of implementation.

2. The Teacher-Training Team - concerns itself with all problems relative to the teacher. This team, or a committee thereof, conducts a teacher-training program. First, it conducts three-day released time orientation

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

sessions to assist teachers to initiate T4C in their classrooms. To day, eight (8) "supervisors" have been assisted in the conduct of orientation sessions for their own teachers and those of nearby districts. Richard Harnack, Assistant Director of T4C has worked with them and provided them with a training manual which we have developed over the years. After the teacher's orientation, the Teacher-Training Team provides them in-service, on-the-job training to sustain them in a more effective implementation of T4C.

This semester seven (7) supervisors and three (3) T4C staffers are conducting fifteen-three-hour meetings with college credits in conjunction with Newark State College, Trenton State College, and Glassboro State College. Each of these institutions furnished a coordinator, who with Mr. Harnack assisted in the instruction for these courses. In addition, this team is urged to provide half-day in-service sessions to upgrade the technical expertise of the T4C teachers. During these sessions, representatives of the business, industrial, world-of-work community (we call them Team IV) relate to the T4C action.

3. The Curriculum-Development Team - concerns itself with all curricular matters, always, with the welfare of the individual pupil in position of top priority.

Part of the operation of T4C is to help each child maintain a record of his plans, actions and achievements in an Individual Pupil Log (I.P.L.). The teacher utilizes this I.P.L. for several purposes: (1) to provide feedback to the learner, (2) to make a more intelligent and specific report on each individual pupil (this is the <u>accountability</u> intended by the behavioral objectivists) and (3) to furnish pertinent input data for the use of the Curriculum-Development Team.

As the team studies the I.P.L.'s, or reports or abstracts on them, they are in a position to recommend certain activities for certain general grade levels. However, keeping in mind that jobs now existent need not necessarily be pertinent to the next generation, we feel that the emphasis must always be on the most effective personal development of the individual. Less attention should be given to teaching him, since present methods fail to give half of the students between 5th and 12th grades a comprehensive coverage of present career occupations. Devote more attention to the best of self-awareness and less attention to program development.

We have taken this approach, because we are firmly convinced that the majority of elementary teachers aren't primarily concerned with career education (or science or math), but they are concerned with language arts and social studies. Since they are the only teachers of elementary school children, we have no choice but to work with them (if we are to work "in the systems"). We achieve excellent results by "piggy-backing" small concrete experiences of a career educational nature onto the activities they are anxious to bring before their pupils in the interests of better achievement in the basic areas of traditional education.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Mr. Geoffrey T. Nicholls -3- January 19, 1972

I am not so sure that you want to dwell at length on the early history of the project. I noticed your reference to Miss Hunt who was the first director for only two years, but you make up your own mind about that. We have spelled out the objectives rather specifically to our satisfaction and to that of participating teachers and supervisors. I have indicated them in the Rationale which I am enclosing.

Second, I am sorry not to be able to rank the cards as you have requested. The statements included on the cards are specifically related to industrial arts, and the terminology frequently just doesn't apply. I spent about ten minutes sorting them into three categories you indicated and felt that I had to take great license in this course grouping. I realized the utter futility of time ranking these individual groups and had to stop. Of course, I have no objections to your doing such a ranking from what you know of T4C by virtue of our writings. They are in 2 places

Once again, I am sorry not to have given you everything that you wanted, and I wish you well in your study. Under separate cover, I am returning your program description and card sort.

Sincerely,

Fred Dreves

Fred J. Dreves, Ed.D.
Director
Technology for Children Project
Division of Vocational Education

FJD:vr

Enclosure

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

THE SCHOOL BOARD OF BROWARD COUNTY, FLORIDA

January 10, 1972

Nova Schools 305 587 0600
Warren G. Smith, Director
3600 S. W. College Avenue
Fort Lauderdale, Florida 33314

Hilton C. Lewis, Principal
Nova High School
3600 S. W College Avenue
Fort Lauderdale, Florida 33314

Mrs. Katherine LaBelle
Principal Nova
Blanche Forman Elementary
3521 Davie Road, S. W.
Fort Lauderdale, Florida 33314

Mrs. Ruby Hutt, Principal
Dwight D. Eisenhower
Elementary School
6501 S. W. 39 Street
Fort Lauderdale Florida 33314

Geoffrey T. Nicholls, Principal Investigator
Department of Industrial & Vocational Education
The University of Alberta
Edmonton 7, Alberta, Canada

Dear Mr. Nicholls,

Please excuse the delay in responding to your letter of November 3. I assumed Mr. Wood's duties as Supervisor of Technical Science in December of 1970. He took a new position in another state. The work load is and has been rather heavy of late, and your request, with some others, wound up buried in a pile of desk papers.

The conclusions for the comparison instrument were arrived at in the following manner. I went through the rating procedure myself, then recorded the results. Next I had each of the two elementary Industrial Arts teachers separately go through the rating procedure. Again the results were tabulated. Then I selected those responses that were commonly agreed on and through a process of elimination weighed the remaining responses and scaled them accordingly. This was done for two reasons. One - the programs vary somewhat between the two schools, and I wanted both reactions. Secondly - I felt the cards served as an excellent device for doing a little soul searching about our program.

I have included in this mailing the following:

1. A description of the Technical Science program by our director Mr. Warren Smith. This was written several years ago and is accurate except for the middle years program - grades 6-8. Last year we tried a new program interrelating Science, Industrial Arts and Social Studies (SISS). The program is under revision but those involved with SISS are completely dedicated to the interrelated concept.

2. A brief on the Nova lower schools written by Mrs. Labelle when she was principal of one of the Nova Elementary Schools. (She is now principal of Nova Middle School.)

3. A Nova Philosophy which was updated last January.

4. A list of the major Practical Arts (Industrial Arts) objectives now being used.

5. A brief description of the program updating it from the above mentioned literature.

I was interested in reading your description of Centennial School District Elementary School Industrial Arts Program. Obviously you had much information on which to base the report.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Geoffrey T. Nicholls
January 10, 1972
Page 2

I regret, because of time and other pressures, I am not able to go into great depth but trust the accompanying description and materials will serve your purposes.

Sincerely,

Robert G. Schaefer

Robert G. Schaefer
Supervisor, Technical Science
Nova Schools

APPENDIX G

Executive Officers of ACESIA

This appendix includes a list of past and present executive officers of the American Council for Elementary School Industrial Arts (ACESIA), who were asked to nominate significant contemporary programs in elementary school industrial arts in the United States of America.

APPENDIX G

Past and Present ACESIA Executive Officers

Mr. Robert G. Hostetter
Department of Industrial Arts Education
Millersville State College
Millersville, Pennsylvania 17551

Dr. William R. Hoots
Department of Industrial and Technical Education
East Carolina University
Greenville, North Carolina 27834

Dr. Delmar L. Larson
Department of Industrial Education
Eastern Michigan University
Ypsilanti, Michigan 48197

Dr. William A. Downs
Division of Industrial Arts and Technology
Central Missouri State College
Warrensburg, Missouri 64093

Mr. Carroll Osborn
Department of Industrial Education
Eastern Michigan University
Ypsilanti, Michigan 48197

Dr. Franklyn C. Ingram
Department of Industrial Arts and Technology
Kent State University
Kent, Ohio 44240

Dr. Harold Gilbert
Department of Industry and Technology
Northern Illinois University
DeKalb, Illinois 6o115

Dr. Eberhard Thieme
City School District
13 Fitzhugh Street, South
Rochester, New York 14614

Dr. Robert G. Thrower
Department of Industrial Education
Trenton State College
Trenton, New Jersey 08625

Dr. Mary-Margaret Scobey,
San Franciso State College
1600 Holloway Avenue
San Francisco, California 94132

APPENDIX H

Statements Used to Define Factors

This appendix includes a list of statements, together with their factor loadings, which were used to determine the common elements present in Factors 1 through V1.

APPENDIX H

STATEMENTS USED TO DEFINE FACTORS

Factor 1 -- Functional Activities.

8) Activities are usually limited to short blocks of time (-.80).

9) Instruction places emphasis upon the excellence of the final product and the skills and procedures involved in its construction (.67).

15) Role playing is advocated as a method to more successfully achieve mastery of the program (-.80).

23) The program promotes occupational awareness by helping the pupil to identify and differentiate a wide variety of occupations (-.83).

24) The program provides the student with knowledge about the world of work, its requirements, demands, rewards and opportunities (-.74).

25) The program provides opportunities for the pupil to develop self concepts in terms of occupations through involvement in simulated job situations (-.86).

26) The program is designed to encourage pupils to act with autonomy and self direction in solving problems and making judgements (.81).

40) The program aims at encouraging self expression and creativity through and in large numbers of materials and products (.80).

48) Activities in the program are focused upon the correct and skilful use of basic hand tools to process a variety of materials (.86).

50) The content places a major emphasis upon the use of a diversity of materials and allied processes (.94).

Factor 11 -- Content Determinants.

4) The program is offered as a structured content continuum that follows successively throughout the elementary school years (-.81).

7) Content is determined by the teacher alone (.74).

10) The content consists of selected industrial concepts and their applied technical experiments (-.66).

12) The program emphasises experience with a variety of current industrial methods, including line production technique, use of jigs and fixtures and the interchangeability of parts (.89).

16) The content is determined through a team approach involving the teacher and an industrial arts specialist (.95).

18) Films and other audio-visual materials form a major part of the instructional program (-.76).

34) The program is based on selected practical experiences that provide for an understanding of industry and its workers (-.74).

41) The program is not presented on a rigorous daily or weekly schedule but is kept flexible so that the activities can meet the needs of the school and the individual class (.67).

44) An industrial arts consultant directs the activities, the teacher co-operating in planning the work and assisting in carrying out the activities (.92).

52) Activities are co-ordinated with other subjects for enrichment of subject matter (.80).

Factor lll -- Specialized/Affective Functions.

14) The content is closely correlated with subject matter in other areas of the elementary school curriculum (.85).

19) Pupils are encouraged to progress at their own rate at a number of work stations (-.97).

29) The development of desirable, safe work habits is integrated into the entire program (.74).

38) The content is derived from activities that support work done in the other subjects of the elementary school (.77).

Factor lV -- Instructional Organization.

22) In teaching industrial arts subject matter, emphasis is not placed on the constructional activity but on the types of learning which occur as a result of it (.74).

31) Content places a major emphasis upon concrete experiences dealing with manipulation and explanation of materials, tools and processes.

33) Instruction is oriented towards problem solving experiences (-.85).

35) The program is taught by an activity centered, manipulative method (.72).

39) Emphasis is placed upon children acquiring worthwhile work attitudes, such as co-operation and appreciation of a job well done (-.66).

51) Activities included in the program are jointly planned by the pupil and the teacher (.88).

Factor V -- Operational Base.

1) Content is classified under various instructional areas such as mass production, model making, building replicas of inventions, building construction activities, book-binding, printing, etc (.88).

11) The program places emphasis upon using community resources (industrial and commercial visits, talks and demonstrations by members of the community) (-.86).

20) Activities in the program are directed toward the development of recreational interests and hobbies (.83).

47) Consideration is focused on the development of an apprciation of good design and craftsmanship (.76).

Factor Vl -- Pupil Goals.

21) Diversity in instructional approach is built into the program to accommodate individual differences in ability and interest (-.77).

32) The program emphasises the opportunity for pupils to explore and experiment with aspects of their experiences in other subjects in the curriculum (.93).

37) Emphasis is placed upon group activities directed towards a common goal rather than individuals working towards separate goals (-.80).

46) The program provides for the study of industry in its totality, including concepts involving labour, capital and distribution (.65).

APPENDIX J

Computer Program Documentation

This appendix includes details of the computer programs used in obtaining the varimax factor rotation and factor scores referred to in the study.

APPENDIX J

Computer Program Documentation

TITLE:	FACTOR ANALYSIS PACKAGE (FACTO 1)
MACHINE:	IBM 360-67
LANGUAGE:	FORTRAN lV (H)
PROGRAM TYPE:	COMPLETE
SUBPROGRAMS:	DATRAN, ORIFAC, CORREL, TETRA, PRINT2, PLAT, EIGCAL, EIGEN (SSP)
LIMITS:	100 Variables, 25 Factors, 99999 Observations

Description

This program carries out a principal components factor analysis from either raw data or a correlation matrix. If raw data is used then either Pearson correlations or tetrachoric corrleations are calculated.

Varimax, Quartimax, and Equamax orthogonal rotations are automatically applied to the principal axes factors.

TITLE:	FACTOR SCORES (FACTO 2)
MACHINE:	IBM 360-67
LANGUAGE:	FORTRAN lV (H)
PROGRAM TYPE:	COMPLETE
SUBPROGRAMS:	CORREL, PRINT2, MATINV, FSCOR, PRNTUP
LIMITS:	50 Variables, 50 Factors

Description

Given a factor structure matrix and the original data, this program computes factor scores for each person on each factor.